
# USER MANUAL

AGN/C SERIES

File: 2014-11-20 ER-AGNC-109 AGC073 GB

## *Contents:*

## *1. General description*

AGN…C series balances are destined for high accuracy weighing in laboratory practice. Balances are equipped with internal calibration system for accuracy control during balance operations.
All balances are metrologically tested. According to an order balances can be calibrated or legally verified.
Balances with legal verification comply with certificate of type approval and are marked with the following legal and securing items:
- green metrological mark placed on the balance name plate,
- notified body stamp (number of notified body) on the balance name plate,
- protective seals placed on: an edge of balance name plate, the casing mounting screw and in the place of access to adjustment switch,

In order to renew legal verification please contact authorized service of AXIS.
Balance classification according to PKWiU: 33.20.31.
Certificates:


Certificate of ISO quality system
DIN EN ISO 9001:2000

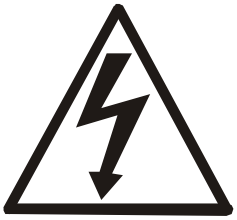

Certificate of balance type approval
TCM 128/06-4428

## *2. Completeness*

A standard set consist of:

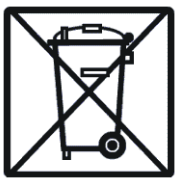
1. Balance,
2. Tin floor of weighing chamber and pan,
3. Pan support and a pan,
4. Feeder 12V / 1,2A,
5. User manual,
6. Guarantee card

## *3. Safety rules*



It is necessary to follow safety rules of work with the balance shown below. Obeying those rules is the condition to avoid electrical shock or damage of the balance or connected peripheral devices.

- Repairs and necessary regulations can be done by authorised personnel only.
- To avoid fire risk use a feeder of an appropriate type (supplied with the balance) and supply voltage have to be compatible with specified technical data.
- Do not use the balance when its cover is opened.
- Do not use the balance in explosive conditions.
- Do not use the balance in high humidity environment.
- If the balance seems not to operate properly, switch it off and do not use until checked by authorised service.



According to current acts of low about protection of natural environment, wasted balances should not be put into waste containers together with ordinary waste.

- Wasted balance after operation period can be delivered to units authorized for gathering wasted electronic devices or to the place where it was bought.

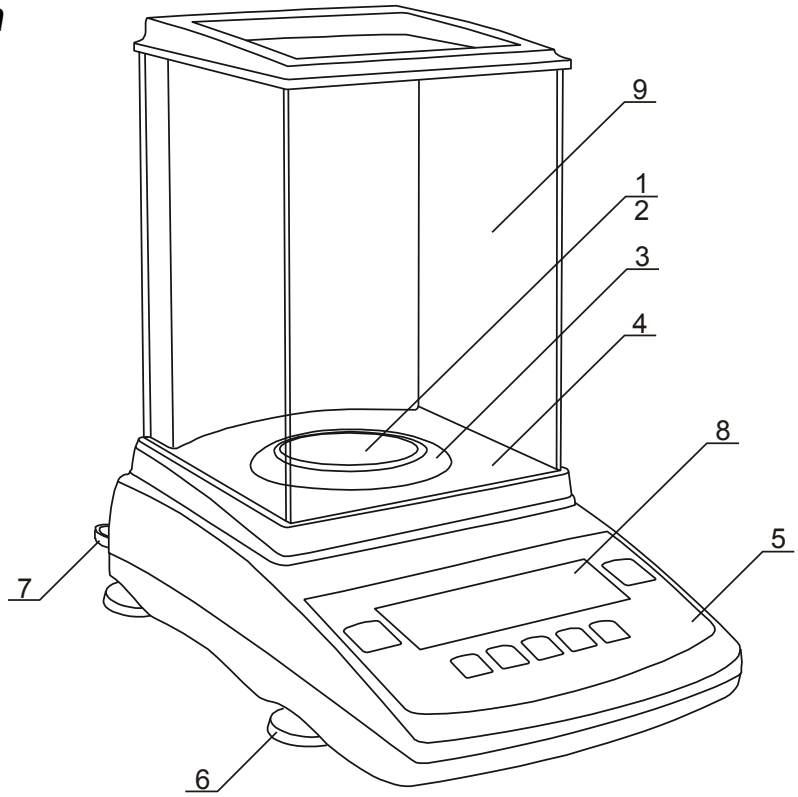
## *4. Technical data*

| Type | AGN50C | AGN100C | AGN200C | AGN220C |
|---|---|---|---|---|
| Capacity (Max) | 50g | 100g | 200g | 220g |
| Min load (Min) | 10mg | 10mg | 10mg | 10mg |
| Reading unit (d) | 0,1mg | 0,1mg | 0,1mg | 0,1mg |
| Verification unit (e) | 1mg | 1mg | 1mg | 1mg |
| Tare range | -50g | -100g | -200g | -220g |
| Accuracy class | I | | | |
| Working temperature | +18 ÷ +33 °C | | | |
| Weighing time | <6s | | | |
| Pan dimension | ϕ90mm | | | |
| Balance dimension (with legs) | 215(235 with legs)x345x350mm | | | |
| Weighing chamber dimensions | 175x140x230mm | | | |
| Power supply | ~230V 50Hz 6VA / =12V 1,2A | | | |
| Balance weight | 6,5kg | | | |
| Recommended calibration weight (OIML) | E2 50g | E2 100g | E2 200g | E2 200g |

*Caution:*
E2 is international symbol of calibration weight class according to O.I.M.L. Some requirements for weight accuracy are connected with this class.

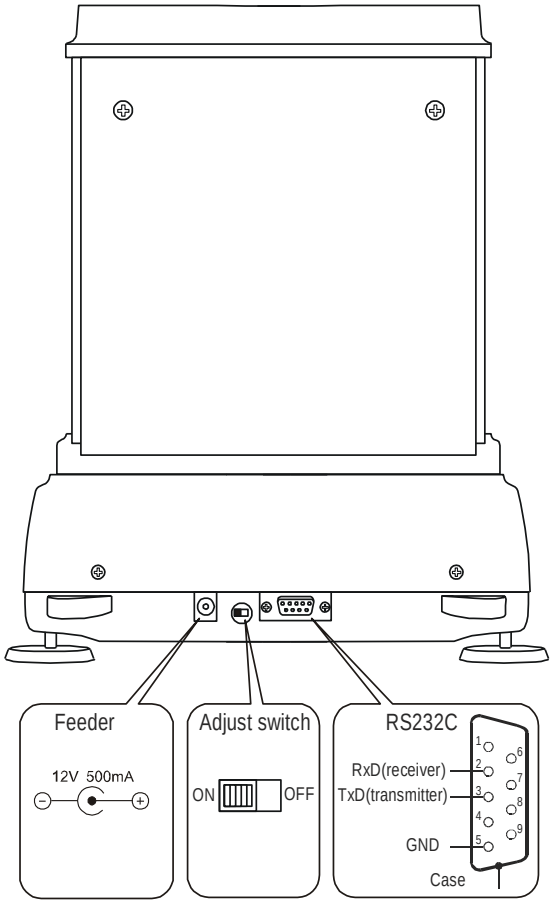
## *5. General balance description*

Balance view

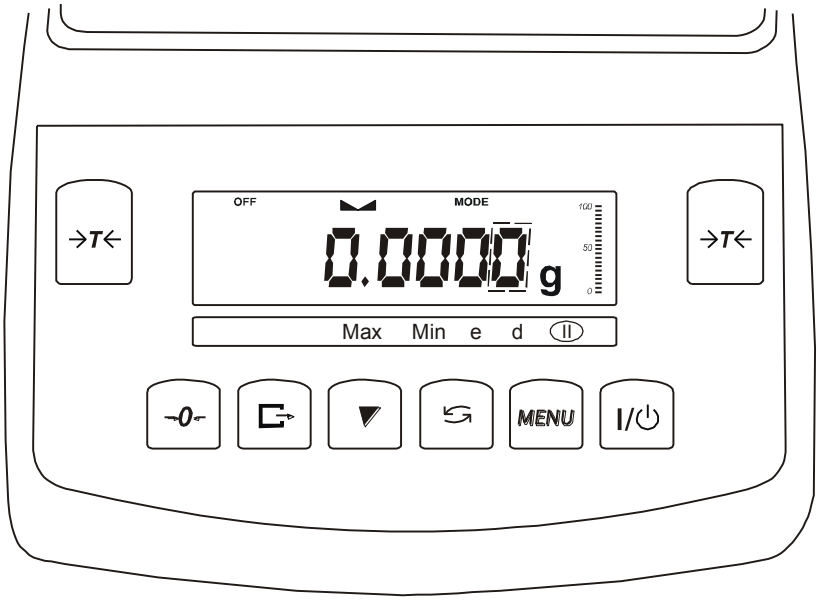



1 – pan
2 – pan support
3 – pan ring
4 – floor of weighing chamber
5 – keys
6 – rotating legs
7 – water level
8 – LCD display
9 – weighing chamber

Back view



## 6. Keys and indicators

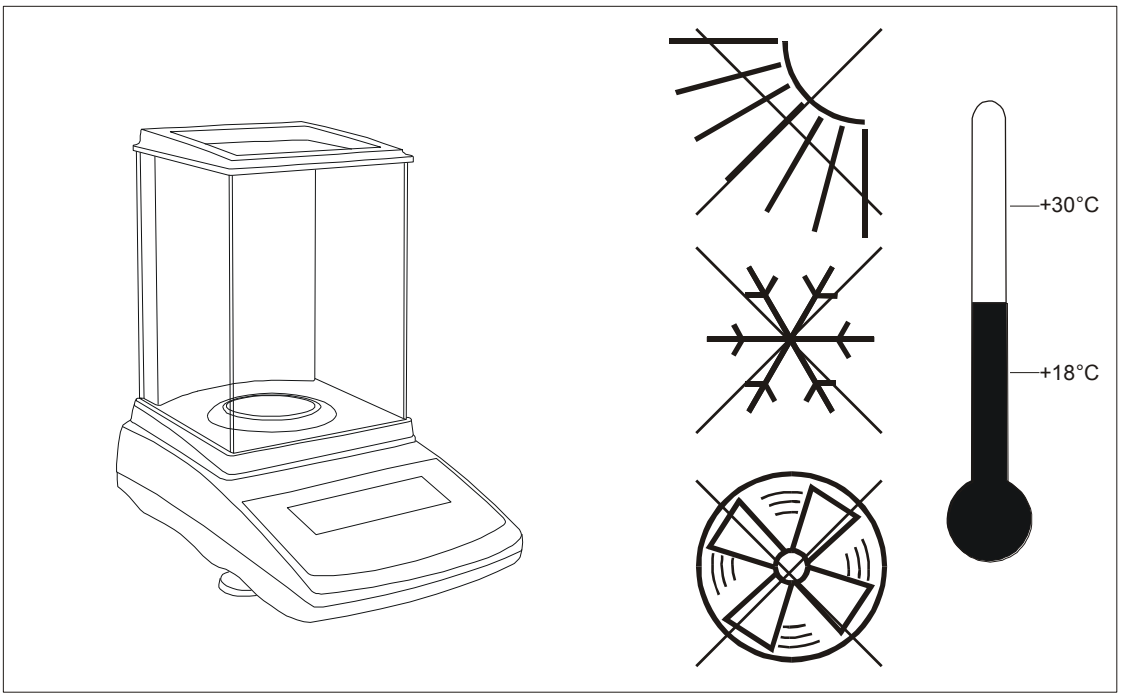


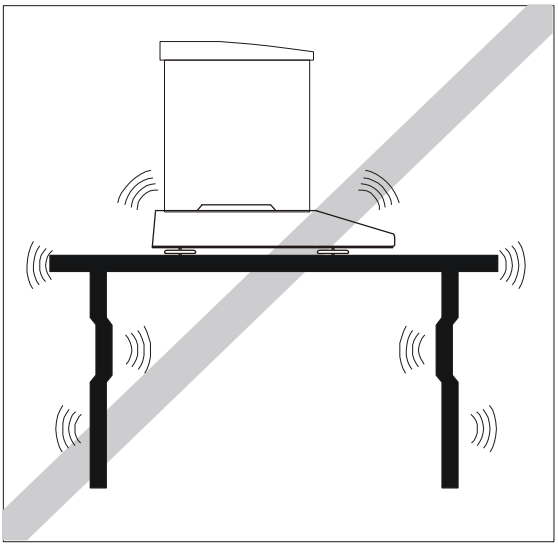

Description of basic key functions and indicators:

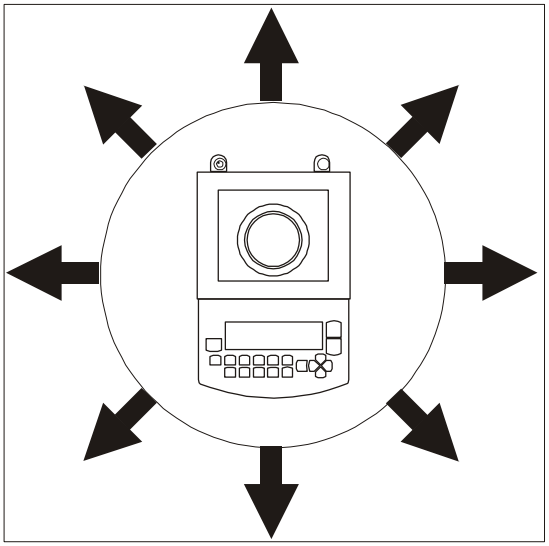
| | | |
|---|---|---|
| *→T←* | - | tarring (enter mass subtracted from weighed mass)/ confirmation of selected menu options, |
| *→0←* | - | zeroing (option), |
| ⊏→ | - | result printout (transmission), |
| ▼ | - | internal calibration,/ accelerated options viewing |
| ↻ | - | switch: special function/ weighing, |
| *MENU* | - | enter to special function menu, |
| I/ ⏻ | - | switch on / switch off (standby), |
| ▂ ▂ indicator | - | shows stabilization of weighing result, |
| linear indicator | - | indicator of balance load (0-100%), |
| *OFF* indicator | - | appears after the balance is switched off with I / ⏻ key, |
| distinction of last digit | - | informs that reading unit value is lower than acceptable indication error (balances with legal verification, d≠e) |
| Max, Min, d, e, I | - | metrological parameters of the balance. |

The use of keys during entering numeric values (special functions):
▼ - increment current digit,
⊏→ - insert comma,
*→T←* - move to next position,
*MENU* - finish entering.

## *7. Preparing working environment*



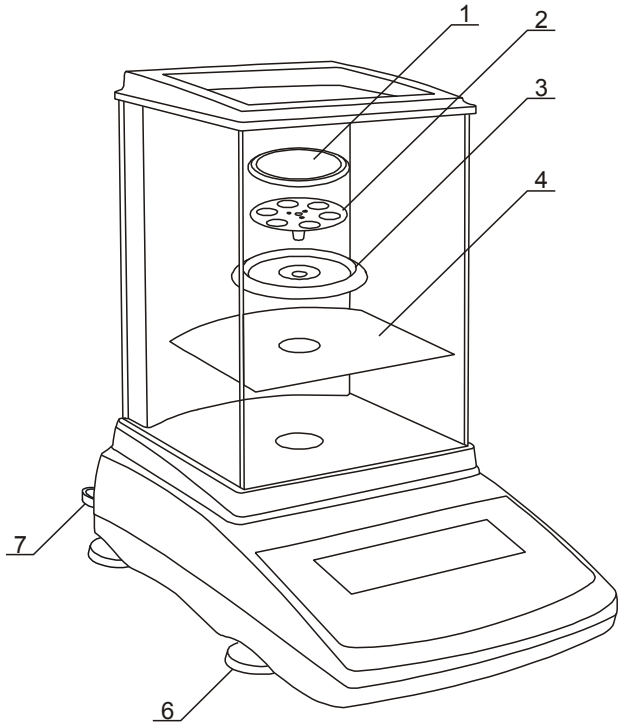





Location for the balance should be chosen with care in order to limit influence of the factors that can interrupt working balance. This location has to maintain proper temperature for working balance and necessary space for its operating. The balance should stay on stable table made of material that does not influence magnetically on the balance.

Rapid air blasts, vibrations, dust, rapid temperature changes or air humidity over 75% are not allowed in balance surrounding. The balance should be far from heat sources and devices emitting strong electromagnetic or magnetic fields.

## *8. Preparing balance to work*




1. Take the balance, the feeder and mechanical elements of the pan out. It is recommended to keep the original scale package in order to transport the balance safely in future.
2. Place the balance on a stable ground not affected by mechanical vibrations and airflows.
3. Level the balance with rotating legs *6* so that the air bubble in water level *7* at the back of the balance is in the middle.
4. Place tin *4* of weighing chamber.
5. Place ring *3* protecting the pan against hit from a side.
6. Gently insert the mandrel of pan support *2* into balance mechanism socket through the pan ring 3 and the pan *1* on

7. Take feeder off the box.

If the balance was taken from a lower temperature surrounding to a room with higher temperature, e.g. in winter, moisture can liquefy on the balance casing. Do not connect power supply to the balance, because this can cause damage or improper work of the balance. In this case leave the balance for at least 4 hours unplugged for acclimatization.

## *9. General operation principles*

Do not overload the balance more than 20% of maximum capacity.
Do not press the pan with a hand.

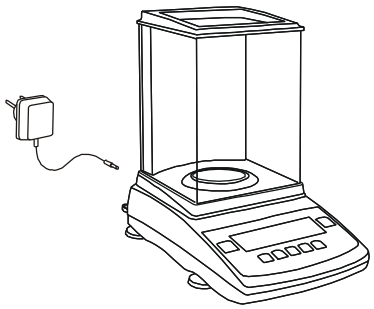
For transportation take off the pan (move it gently and lift it up) and pan support (lift it up) and protect from any damages.

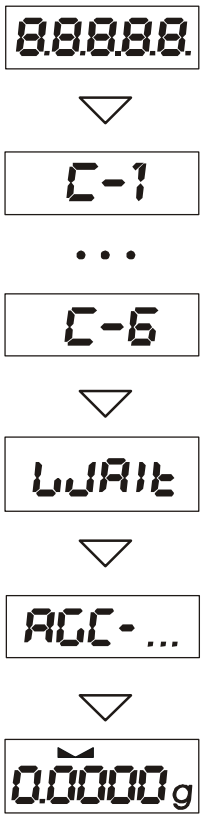
1. Weighed sample should be placed in the centre of the pan.
2. Weighing result should be read when the indicator "◣◢" lights, which signalises stabilisation of a result.
3. The balance allows tarring in the whole measuring range. To tare the balance press →*T*← key (on the left or on the right). Tarring does not extend measuring range, but only subtracts tare value from mass value of a sample placed on the pan. To make the control of pan load easier and to avoid crossing measurement range, the balance has a load indicator calibrated 0÷100% Max.
4. In direct sale use (d=e), make sure that →*0*← zero indicator is displayed before sample is placed on the pan. If not, press →*0*← key and wait until the balance is zeroed and zero indicator appears. In other balances the key does not operate.
5. When the balance is not used but should be ready to work immediately, it can be switched off by pressing I/⏻ key. The backlight of balance reading system is then switched off and the balance enters into "standby" mode, in which the balance maintains internal temperature and ability to start working with maximum accuracy. Standby mode is signalled by the *OFF* indicator. To switch the balance on press I/⏻ key.
6. The balance cannot be used to weigh ferromagnetic materials due to decrease of weighing accuracy.
7. Balance mechanism is a precise device sensitive to mechanical shocks and strokes.
8. After every change of balance position, level the balance and perform internal calibration using ◤ key.

## *10. Start-up*

Plug feeder into 230V power supply socket. When the pan is empty plug feeder output connector into 12V socket at back of the balance. Autotests and internal calibration will be performed.

***Steps after start-up of the balance:***






Display test.

Tests of electronic components.

Test of internal calibration (engine heard).

Internal calibration (in not legally verified balances can be terminated using ▼ key).

Displaying balance program version.

After zeroing the balance is ready to weighing.

It is recommended before making measurements to wait until internal temperature of balance stabilize. To accomplish that, the balance should be turned on for more than 2 hours before measurements. From the perspective of measurements accuracy continuous balance operation is beneficial.

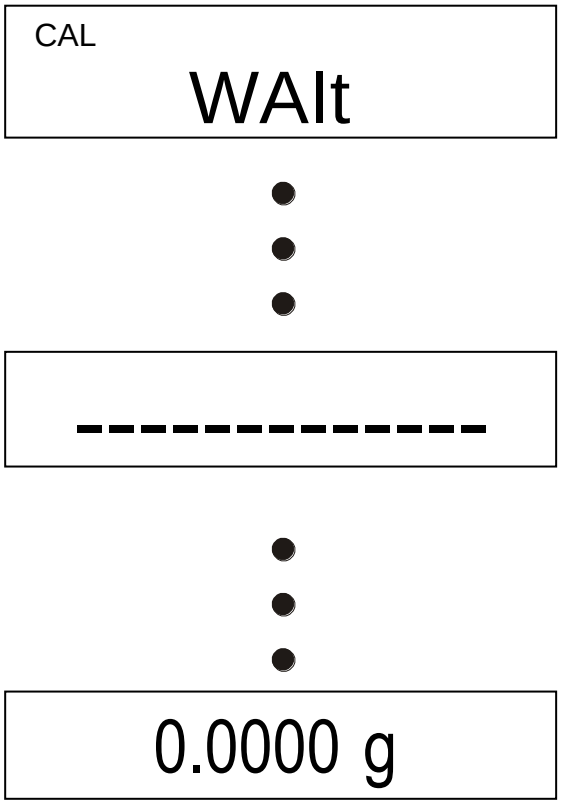
## *11. Internal calibration*

The balance is equipped with internal calibration system, which general task is to maintain required measurement accuracy on the balance.
Internal calibration is the process of putting internal weight on automatically by balance mechanism and correcting accuracy in balance firmware. The correction is necessary because of differences between values of gravitational acceleration in the place where the balance was manufactured and in the place where it is operated, as well as due to changes of balance level and temperature.

Internal calibration is performed in the following situations:
- when ▼ key is pressed,
- after defined time interval (for legally verified balances - 2 hours),
- after temperature change (for legally verified balances – more than 2°C).

In legally verified balances time interval is set to 2 hours and defined temperature change is 2°C. In not legally verified balances those values can be set as calibration options. The reason of starting internal calibration is shown as an icon near weight picture.

In order to perform internal calibration proceed with the following:




Empty the pan.
Press ▼ key twice (double pressing the key helps to avoid accidental starting calibration procedure).

During calibration internal weight is put three times on and obtained results are compared.
Discrepancy of results is signalled with a message and causes the balance being blocked.
Until calibration process is finished do not perform any operation on the balance. Any vibrations and shocks interfere calibration process and may delay it or deteriorate accuracy of its result.

When internal calibration is performed successfully the balance indicates zero on the display at empty pan.

***Note:***
In order to terminate calibration process in not legally verified balances press ▼ key and wait until balance mechanism is not settled in initial position.

## 12. Checking the balance

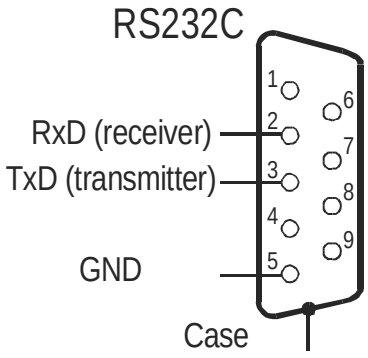
In order to confirm correctness of the balance during its operation, before starting and after finishing every measurement series it is advised to check weighing accuracy. It can be done by weighing external calibration weight or other object with exactly known mass.
If exceeding of allowable measurement error is affirmed, the following things should be checked:

- if the balance stands stable and it is levelled,
- if the balance is exposed on rapid air blasts, vibrations, rapid temperature changes or air humidity,
- if the balance is not affected directly by heat source, electromagnetic radiation or magnetic field.

The cause of inaccuracy can be too low temperature of the balance as well, when it was unplugged from power supply. In this situation leave the balance switched on for several minutes in order to adjust its internal temperature.
If none of above causes of inaccuracy occurs, calibration with external weight should be performed to the balance. Recommended external calibration weight (to buy for additional charge) is given in technical data table. In order to calibrate the balance with external weight in legally verified balances verification seals should be removed and another legal verification should be performed. In this case it is recommended to contact authorized service centre.
Calibration with external weight is described in details in chapter 15.3.

## 13. Connecting the balance to computer or printer

The balance may send data to a computer or a printer via RS232C interface.




When cooperating with the balance, a computer should be equipped with software that allows receiving data from the balance.
AXIS offers computer software to cooperate with balances, available on www.axis.pl website. Free software for basic operations with the balance can be found there.

The balance sends weighing result according to *SEndInG* option in function for setting serial interface parameters (*rS-232C*):
– after initialising signal from a computer,
– automatically after loading a weight on a pan and result stabilisation (*Auto*),
– after pressing ⮆ key and result stabilisation (*b.P Stb*),
– after pressing ⮆ key and without result stabilisation (*butt.P*),
– continuously about 10 times per second (*cont.*).

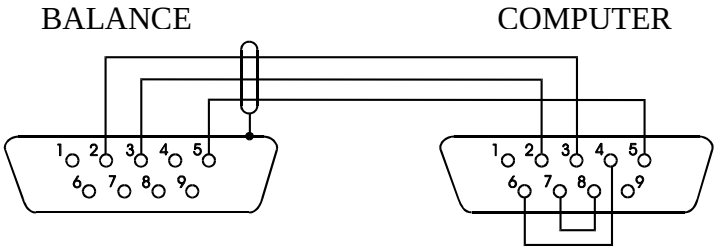
Standard transmission parameters: 8bits, 1stop, no parity, 4800bps. To change transmission parameters use RS232 interface configuration function (*rS-232C*).

*Detailed information for programmers (LONG protocol):*

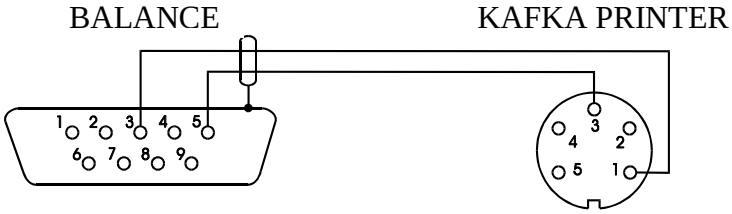
*When cooperating with a computer, the balance sends data as follows:*
*Computer → Balance: initiation signal S I CR LF (53h 49h 0Dh 0Ah),*
*Balance → Computer: weighing result according to the following format:*
*(16 Bytes, transmission parameters: 8 bits, 1 stop, no parity, 4800 bps),*

*Description of particular bytes:*
*Byte 1 - „-“ mark or space*
*" 2 - space*
*" 3÷4 - digit or space*
*" 5÷9 - digit, decimal point or space*
*" 10 - digit*
*" 11 - space*
*" 12 - k, l, c, p or space*
*" 13 - g, b, t, c or %*
*" 14 - space*
*" 15 - CR*
*" 16 - LF*

***WK-1 connecting wire*** *(connects the balance with a computer/9-pin connector):*




***WD-1*** connecting wire *(connects a balance with KAFKA printer):*




***The settings of internal switches in KAFKA printer:***

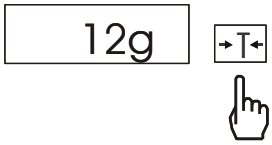
| SW-1 | SW-2 | SW-3 | SW-4 | SW-5 | SW-6 | SW-7 | SW-8 |
|---|---|---|---|---|---|---|---|
| on | off | on | off | off | on | off | off |

## 14. Basic balance functions

In further part of this manual the following graphical symbols will be used at description of balance functions:

- put load on the pan

- take load off

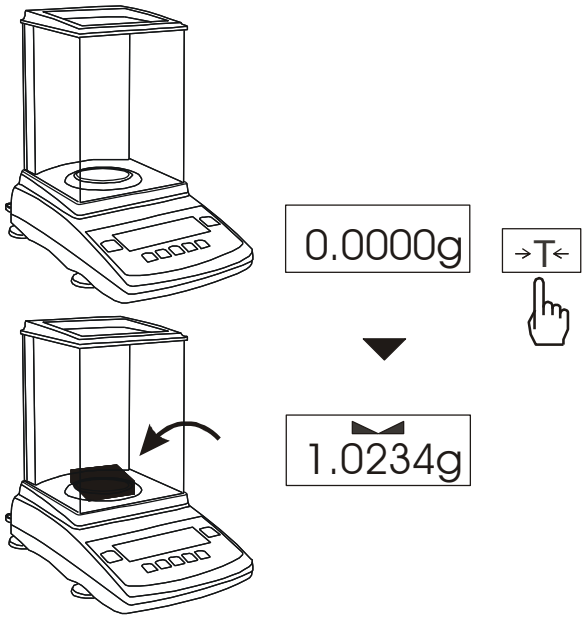



- press a key when indication on the picture is displayed

- forced change

- automatic change

### 14.1 Simple weighing

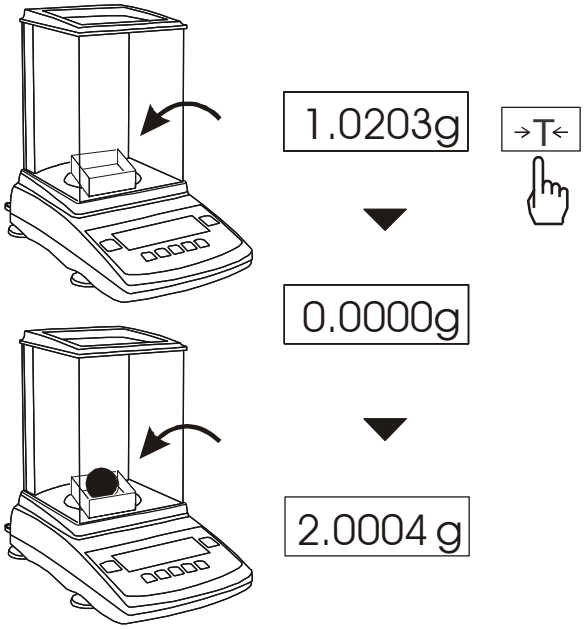



If indication different from zero is shown for empty pan, →*T*← key should be used.

*Note:* In balances for direct sale (option) →*0*← key is used to zero balance without load, and →*T*← key works only for balance with a load, which is taken as a tare.

Weighing result should be read when ⌣ indicator is displayed.

## *14.2 Weighing with tare*




The balance allows taring in the whole measurement range.
Taring operation decrease weighing range for net mass of tare value.

## *15. Special functions*

List of available functions:

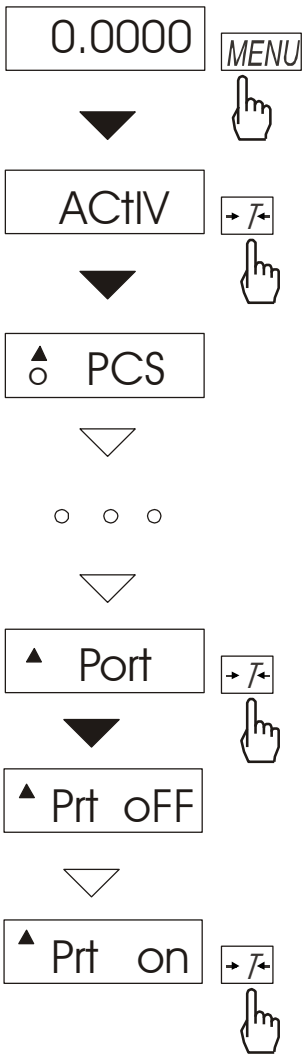
- menu customization function (*ACTIV*).
- autozeroing function (*AutotAr*),
- pieces counting function (*PCS*),
- unit change (*UnIts*),
- percentage weighing function (*PerCEnt)*,
- external standard of mass calibration (*CALIbr*),
- function for setting serial ports mode and parameters (*Port*),
- printout configuration (*PrInt*),
- screen backlighting (*b_LIGHt*),
- recipe weighing function (*rECIPE*),
- animal weighing (*LOC*),
- entering tare function (*tArE*),
- force measurement (*nEWton*),
- maximum and minimum value indication (*UP*),
- anti-disturbance filter (*FILtEr*),
- average calculating function (*AVErAGE*),
- determining solids and liquids density function (*dEnsity*)*,
- statistics (*StAt*),*
- print-out language selection (*LAnGUAG*),
- paperweight calculation function (*PAPEr*),*
- initial settings (*dEFAULt*).

function with additional equipment require:

- options with the clock:
  - setting current date and time function (*dAtE*)
  - total weight function (*totAL*)
- options with the transoptors connectors:
  - checkweighing function (*thr*)

User create own menu by choosing function in *ACtIV* function (described in chapter 14.1).

## *15.1 Menu customization function (ACtIV)*




Among available user functions it is possible to select these, which should be displayed after pressing *MENU* key. It allows avoiding displaying whole list of available functions, which makes operation time longer.

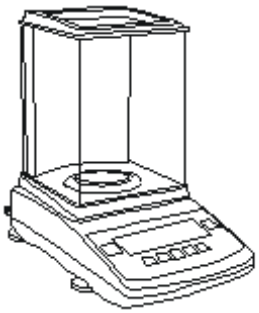
Operation sequence shown in the pictures on the left causes adding function for setting serial interface RS232C parameters (*Port*) to function menu.

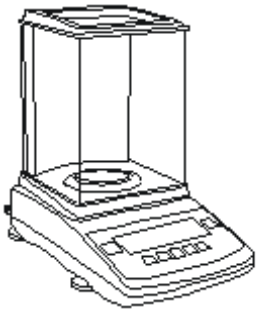
After switching on *ACTIV* function a dot is displayed on the right side (to distinguish from regular menu). Chosen functions are displayed with a dot on the left side.

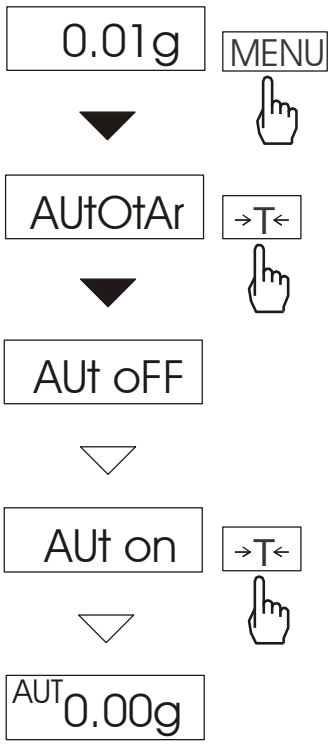
In every moment, it is possible to restore primary (manufacture) settings choosing *dEFAULt* special function.

In order to remove function from menu in the last operation in place of selecting *Port on* choose *Port oFF*.

## *15.2 Autozeroing function (AutOtAr)*





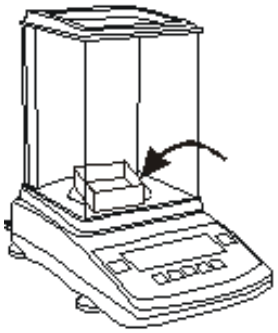



When *F..-Aut* function is activated, the scale automatically ensures stable zero indication if the pan is empty or if zero indication was acquired by pressing →*T*← key.
After choosing this option from *MENU* following options appear:
*Aut off* – function off,
*Aut on*- function on,
*Aut Set* – changing zero leakance speed which is corrected by function.
We confirm selected options by clicking on →*T*← when it's displayed on the screen.
If we choose *Aut Set* the speed correction is possible. Click →*T*← when the speed is displayed and then insert new speed using ◤, ⮆, →*T*← (chapter 6) keys. Confirm by clicking *MENU* key.
Diagram on the left shows how to turn on the autozeroing function.

To leave the function press *MENU* key, then with →*T*← key chose *AutoTar* and *Aut oFF*.

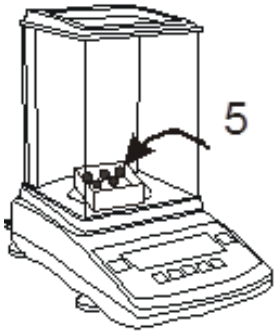
Note:
*Autozeroing function is activated automatically for 10 min. after switching-on.*

## *15.3 Pieces counting function (PCS)*



12.05 g →T←

0.00 g



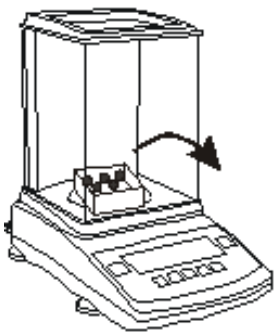

23.04 g MENU

PCS →T←

PCS oFF

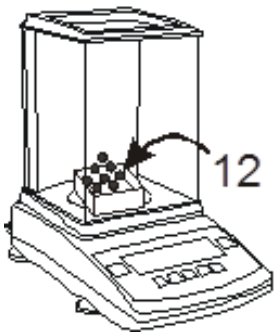
PCS on →T←

PCS . .



PCS 5 →T←

0 pcs




12 pcs

The function allows counting identical pieces, for example pills or buttons included into weighed portion.
In order to star the function, tare the balance, put several pieces and press *MENU* key. Then, using *→T←* key, choose *PCS* and *PCS on*.
Measurement is performed in two phases:

- first phase – calculating the mass of single item basing on a sample containing defined amount of pieces: 5, 10, 20, 50, 100, 200 or 500 pieces; There is also a possibility to insert amount of pieces by choosing *PCS . .* option or to insert single piece weight *PCS uM* . Use the following keys:
  ▼ - increase digit,
  ⊏→ - decimal point,
  *→T←* - next position,
  *MENU* – finish.

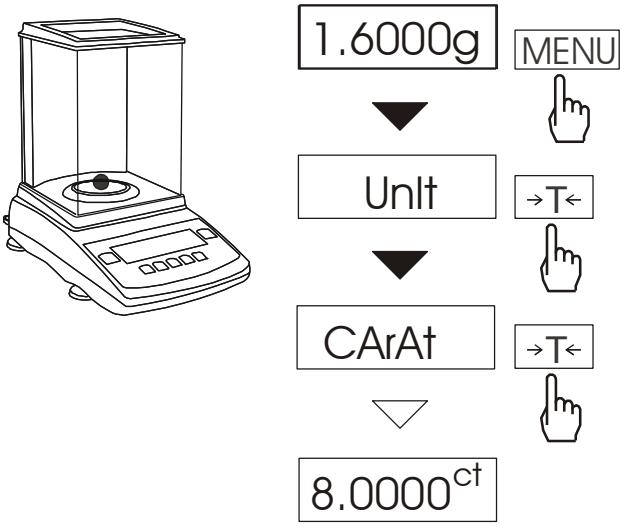
- second phase – counting pieces in weighed portion.

It is advised that mass of single piece is greater than reading unit and mass of sample used in first phase is bigger than 100 reading units.

In order to temporarily return to displaying in mass units use ⟲ key. Using this key once more will cause return to displaying in pieces.

***Comments:***
*PCS Err message indicates that a sample was not put on a pan or a mass of single piece is less than one reading.*
*To select previously used value choose ".." option instead of pieces quantity in a sample.*

## *15.4 Function for changing weighing units grams/carats/pounds (UnIt)*



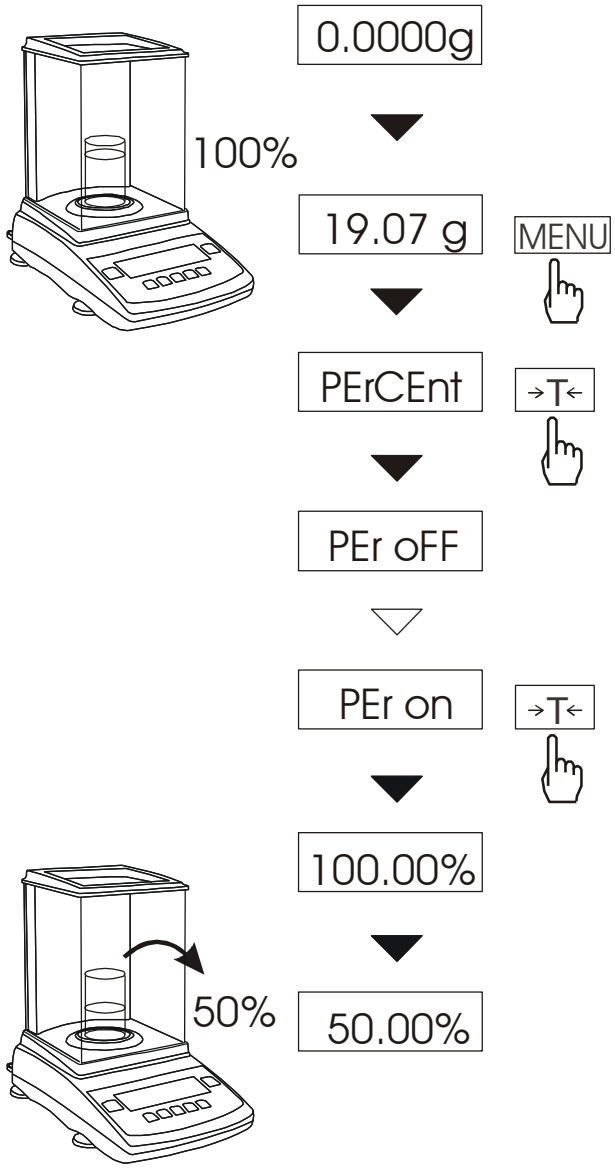

The function allows choosing on of the following mass units:

- *CArAt* (carat, 1ct= 0,2 g),
- *CArAt L* (as above with rounding to 3 digits after decimal point),
- *M GrAM* (miligram,1mg=0,001g),
- *K GrAM (*kilogram),
- *Pound* (1 lb=0,454kg),
- *ounCE* (1oz=28,349523g),
- *ounce t* (trojan ounce, 1ozt=31,103476g),
- *GrAIN* (1gr=0,064798g),
- *PennyW* (pennyweight, 1dwt=1,555g),
- *GrAM* (1g),
- *out* – out of function.

In order to go back to results in grams, use ↻ key. Using this key once more will cause return to displaying in selected units.

The example on the left shows setting carats as balance unit.

## *15.5 Percent function (PErCEnt)*




The function allows displaying weighing result in percents.
Measurement is performed in two phases:
-first phase – weighing reference mass (mass referenced to 100% )
-second phase – weighing sample mass as a percent of reference mass

Weighing result is displayed in various formats, depending on reference mass value. For reference mass values between 0÷3,5% of balance capacity, format of weighing result is *100.0*, for values between 3,5÷35% it is *100.00* and above 35% - *100.000*.

The function has the following options:
- *PEr oFF* – deactivate the function,
- *PEr on* – save current indication as 100%, start weighing in percents,
- *out* – exit without changes.

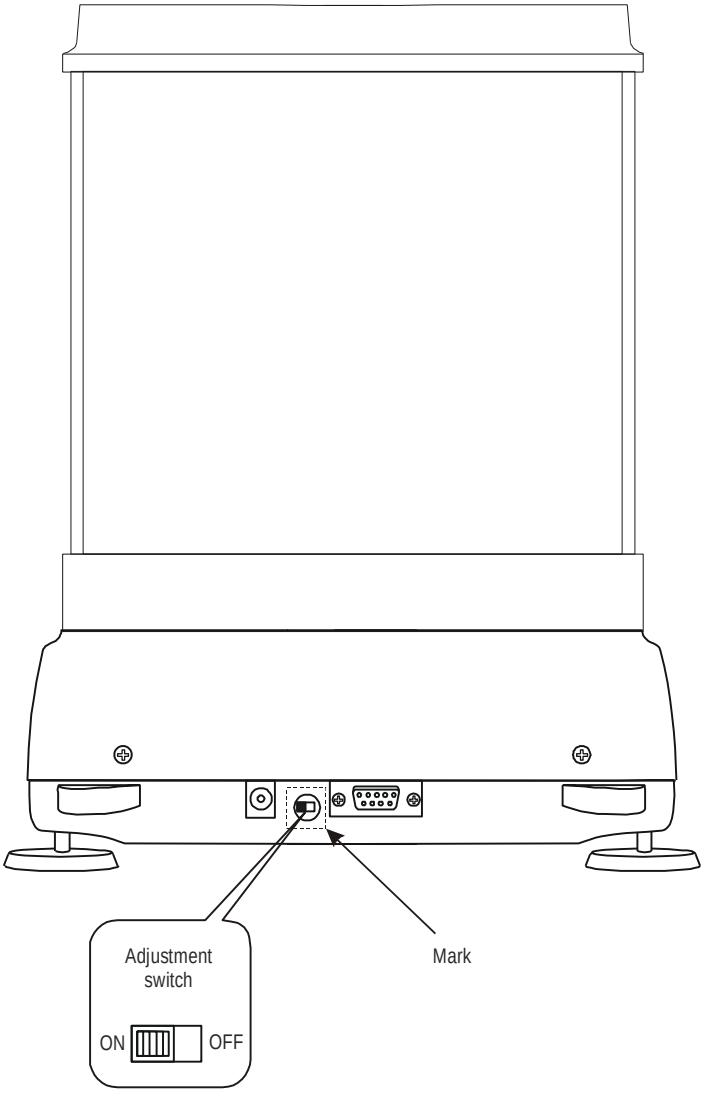
In order to go back to indication in mass units use ⟲ key. Using this key once more will cause return to displaying in %.

***Caution:***
1. *PEr Err* message informs that reference mass is less than 0,5·Min or was not defined.
2. When the balance shows weighing result in percents, *→T←* key works as usual.

## *15.6 Function for calibration with external weight / calibration options (CALIbr)*

Calibration with external weight should be performed if balance accuracy after internal calibration is not satisfactory. Calibration weight stated in technical data table for the balance (or of better accuracy) with valid verification certificate should be used then.

Calibration of legally verified balance requires violating a mark used to protect an access to adjustment switch and results in loosing legal verification. To renew legal verification of the balance, it is necessary to contact a service or notified body.

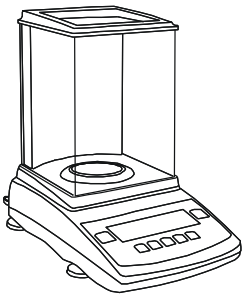


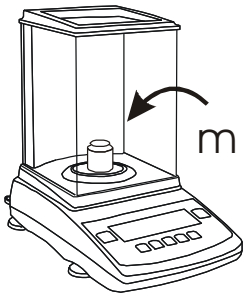

In legally verified balances performing calibration requires changing adjustment switch position, which is placed behind protecting mark (sticker) of a notified body. An access to the switch is possible only after removing the mark. Therefore, balance calibration causes lost of legal verification and, in consequence, the necessity of renew legal verification in the nearest notified body or in place where the balance is used.

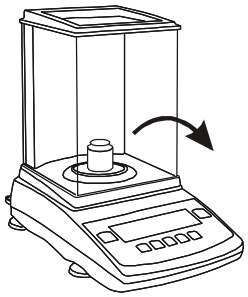
Before proceeding with calibration of legally verified balance, adjustment switch should be set to *ON* position using thin screwdriver (the balance will display the message *Pr ON*).

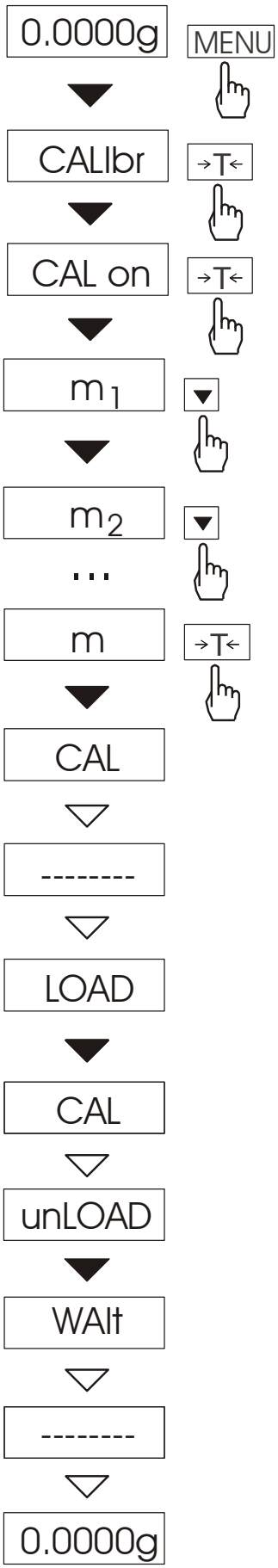
When calibration process, described on next page, is finished, the balance will display the message *Pr ON*. Adjustment switch should be set to *OFF* position using thin screwdriver (the balance will move to weighing).

***Steps during calibration with external weight:***








Press *MENU* key to display user functions, shown one by one in loop.
Choose calibration function pressing *→T←* key when *CALIbr* function appears.

The following options will be displayed:
- ***CAL oFF*** – switch currently carried out internal calibration off
- ***CAL on*** – perform calibration with external weight
- *CAL Prn* – printout of calibration report
- *CAL tM* – set time interval for internal calibration
- *CAL ℃* - set temperature difference for internal calibration

When *CAL on* option appears press *→T←* key to select function for calibration with external weight.
Press ▼ key several times to select calibration weight value, which will be used for calibration.
Confirm pressing *→T←* key.

When *LOAD* message appears put calibration weight on the pan and press *→T←* key.
Wait until calibration process is finished.

When *unLOAD* message appears take calibration weight off.

Wait for end of balance zeroing.

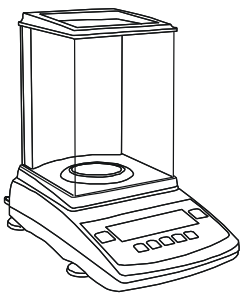
Wait until internal calibration is finished.

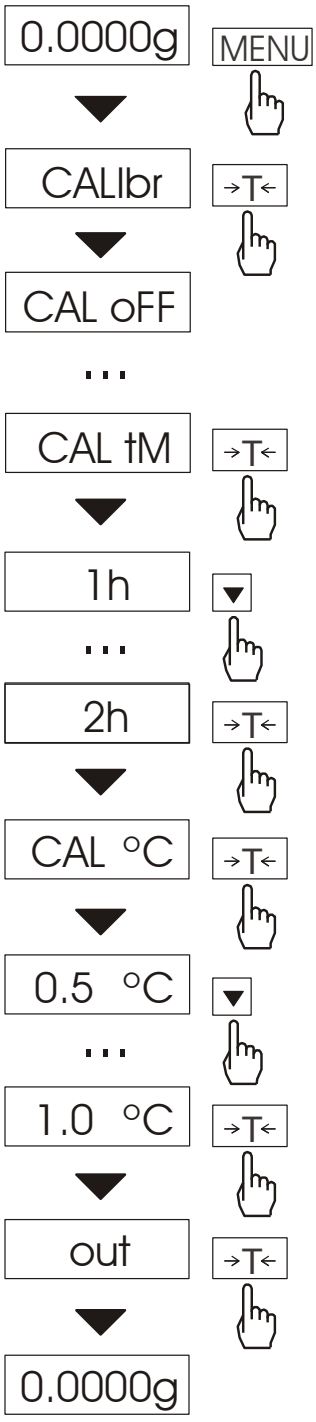
Balance is ready to work.

***Internal calibration options:***

Except of report printout (*CAL Prn*), calibration options are available after changing position of adjustment switch.

Internal calibration of the balance is performed automatically every time the balance is switched on, additionally after given time interval during work and after every temperature change of more than given value.
In order to perform internal calibration in any moment, empty the pan and press ▼ key twice (one more pressing terminates calibration).






Press *MENU* key to display function menu and choose *CALIbr* function by pressing →*T*← key when it is displayed.
The following options will appear:
- *CAL oFF* – switch internal calibration off
- *CAL on* – perform calibration with external weight
- ***CAL Prn*** – printout of calibration report
- ***CAL tM*** – set time interval for internal calibration
- ***CAL ℃*** - set temperature difference for internal calibration

Press →*T*← key when *CAL tM* option is displayed. Predefined time intervals (from 1h to 6h) for internal calibration will be displayed. Select required value or *oFF* (time interval disabled) option by pressing →*T*← key.

Accordingly choose *CAL ℃* option pressing →*T*← key and selecting values of temperature difference or *oFF*.

Select *out* option to finish.

Select *CAL oFF* option to switch off internal calibration permanently.

***The form of calibration report printout:***

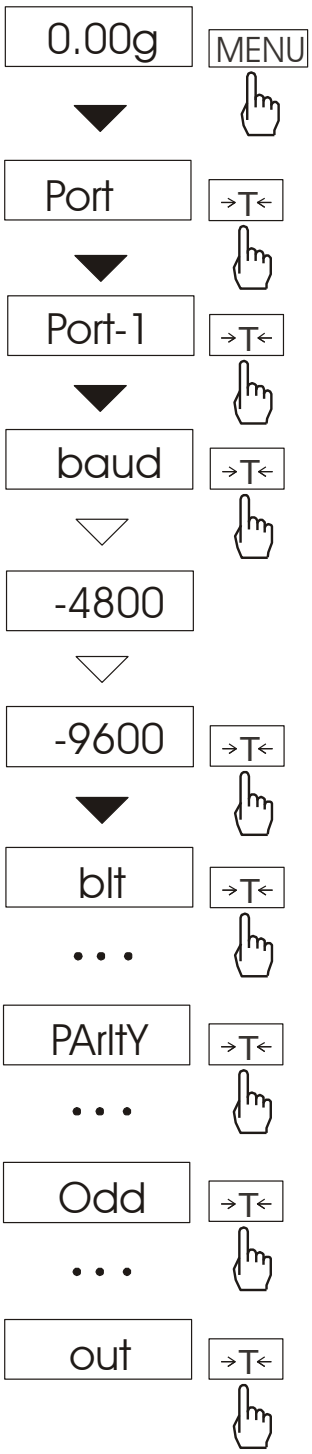
Date : ... Time.: ...

Calibration report

---

| | | |
|---|---|---|
| Date of production | : | ... |
| Scale type | : | ... |
| Serial number | : | ... |
| Program version | : | ... |
| Adjustation no. | : | ... |
| Date of adjustation | : | ... |
| Temperature of adjust. | : | ... |
| Factory external weight | : | ... |
| Factory internal weight | : | ... |
| Current external weight | : | ... |
| Current internal weight | : | ... |
| Weight difference | : | ... |

## *15.7 Function for setting serial ports mode and parameters (Port)*




After choosing function from menu we have two options:
- *Port 1*
- *Port 2*

By choosing equivalent port we can change parameters of this port. If the scale is equipped with only one serial port, choose *Port 1* option.

Turning on the function enables to set the following transmission parameters (standard parameters underlined:

- transmission speed (*bAud: 1200, 2400, <u>4800</u>, 9600, 19200, 38400, 57600, 115200*),
- the number of bits in a byte (*bit*: *7, <u>8</u>*),
- parity control (*PArItY*: *<u>0</u>, 1; Odd: 0, <u>1</u>*),
- data transmission protocol (*Prot: <u>Long</u>, Short, Farb, Fis_E, Fis_A, Pr_CC, Eltron, out),*
- ustawienie trybu pracy portu szeregowego *SendInG.*

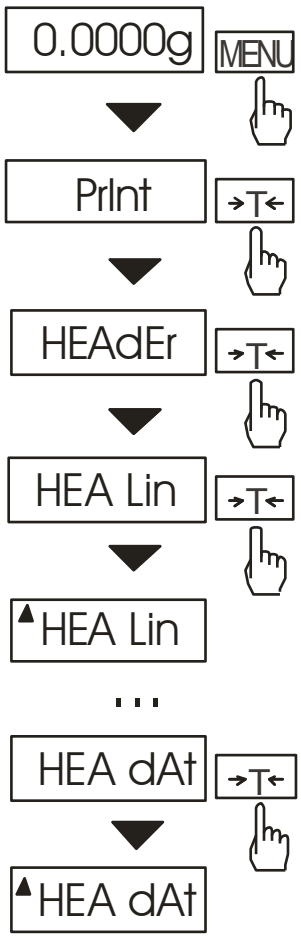
After choosing *SendInG*
- *butt. P* – transmission after using ⮕ key without stabilization,
- *b. P Stb* – transmission after using ⮕ key and indication stabilization
- *Auto* – after taking on and off the load without using ⮕ key,
- *Cont.* - about 10 results per second,
- *Out.*

*Auto* is suggested when working with printer.

To set desired transmission parameters activate *Port* function, choose proper port 1 or 2 and then choose appropriate parameter and press *→T←* key to accept needed parameter value. The example at the left presents how to set transmission speed value to 9600bps.

## *15.8 Printout configuration (PrInt)*

Function is used to place additional information on printouts such as data, scale type, serial number or operator code.

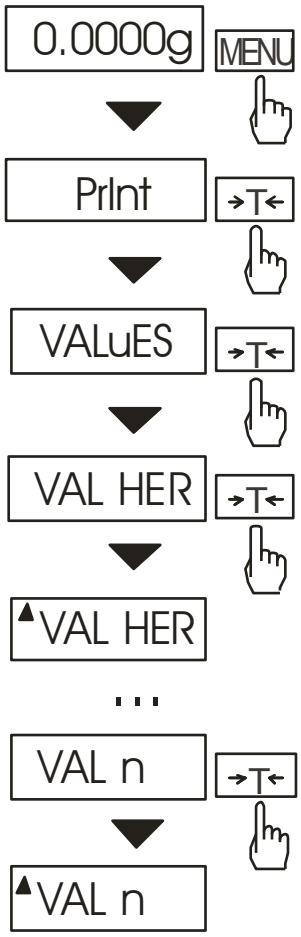



Function enables to turn on/off positions on printouts and to inscribe own number sequence (operator id or product id).
After choosing *PrInt* function from menu following options are displayed:
- *HEAdEr* (header setting),
- *VALuES* (values setting),
- *FOOtEr* (footer setting),
- *SEt Id1* (inserting number sequence Id1),
- *SEt Id2* (inserting Id2),
- *SEt Id3* (inserting Id3),
- *out* .

After choosing ***HEAdEr*** following printout options are displayed:
- HEA Lin – displays empty line,
- HEA Md – working mode,
- HEA dAt – date and hour,
- HEA bAL – scale type,
- HEA SEr – serial number,
- HEA Id1 – Id1 displayed,
- HEA Id2 – Id2 displayed,
- HEA Id3 – Id3 displayed,
- HEA SGn – displays *signature* sign,
- out .

Using →*T*← during one of the options is displayed activates this option. A ▲ sign shows on the left when the function is activated.
On the left we can see how to activate one empty line, date and time in the header.

**Attention:**
In HEAdEr option we only design the structure of the header. Activation of the header is possible in ***VALuES*** option. Without activation of the header in VALuES, the header won't be displayed on the printout.



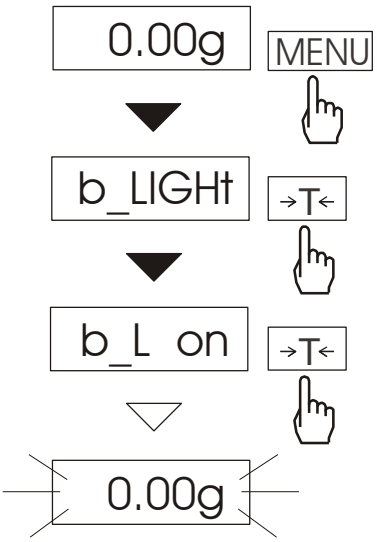

After choosing ***VALuES*** from print function menu following options display:
- VAL HER – header activation,
- VAL Lin – empty line displayed,
- VAL Id1 – Id1 displayed,
- VAL Id2 – Id2 displayed,
- VAL Id3 – Id3 displayed,
- VAL n – measurement number,
- VAL tAr – tare value,
- VAL nEt – netto weight,
- VAL GSS – gross weight,
- VAL Lcd – LCD result,
- out .

On the left we see how to activate header and how to display measurement number on the printout.

After choosing ***FOOtEr*** from PrInt function menu following options display:
- FOO Lin – empty line,
- FOO Md - working mode,
- FOO dat – date and hour,
- FOO bal – scale type,
- FOO SEr – serial number,
- FOO Id1 – displays Id1,
- FOO Id2 – displays Id2,
- FOO Id3 – displays Id3,
- FOO SGN – signature,
- FOO dSh – dashing line,
- FOO 3LI – 3 empty lines,
- out.

To insert numbers when inscribing Id1, Id2 or Id3 we use ▼, ⮓, →T← and MENU keys (chapter 6).

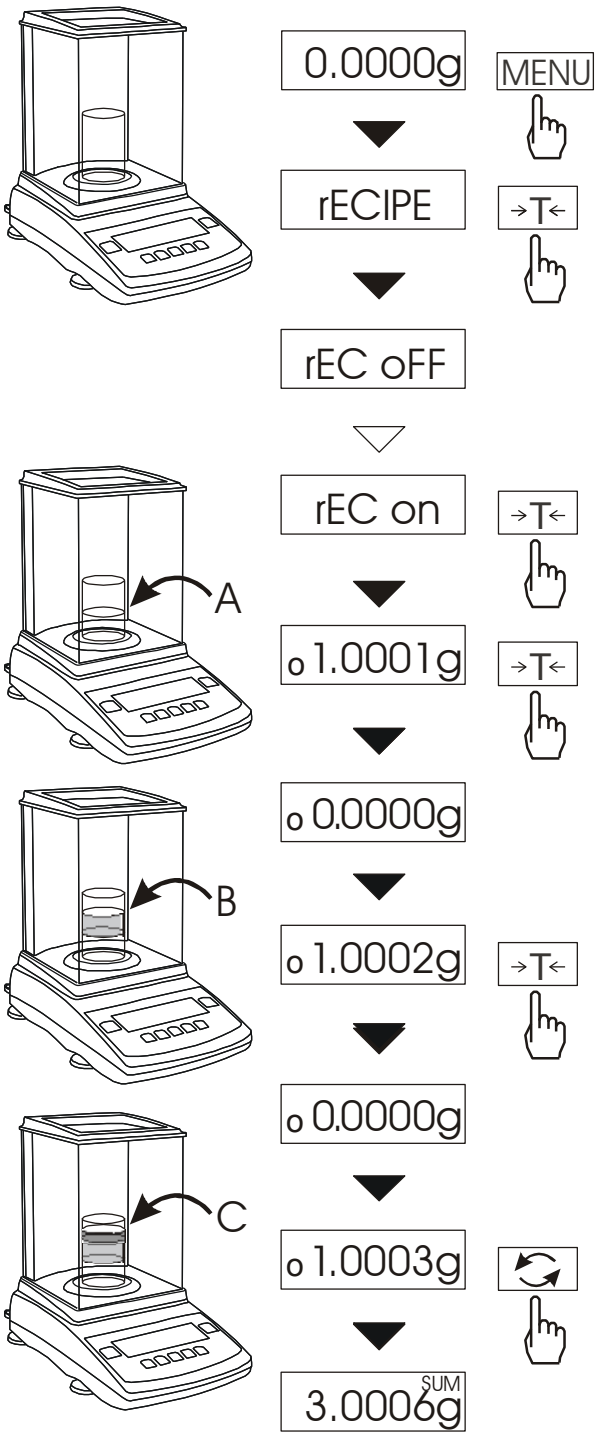
## *15.9 Backlighting setting (b_LIGHt)*




Function enables to choose backlighting mode:

- *b_L OFF* – backlighting off,
- *b_L on* – backlighting on,
- *b_L 1¯2* – backlighting is off after 30 seconds without making any actions (no keys used),
- *out*.

## *15.10 Weigh summation (rECIPE)*




This function enable to weigh few ingredients in one container and to display aggregated sum of all ingredients.
The function has the following options:
-*rEC oFF* – leave the function and display aggregated sum of all ingredients,
-*rEC on* – activate the function,
-*rEC Con* - return to previous series of weighing.

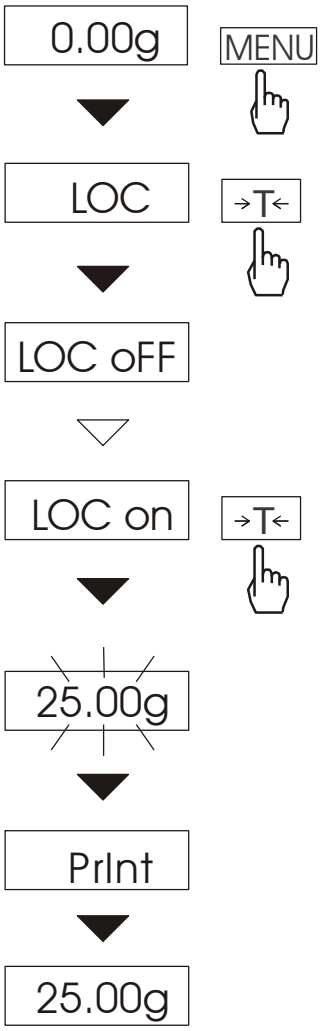
Before weighing each ingredient (A, B, C, etc.) remember to tare the balance.

To read aggregated sum of all previously weighed components press ⟲ key or use *rEC oFF* option. To return to ingredients weighing press ⟲ key again.

***Note:***
When *rECIPE* function is active, the sign *o* is displayed at the left of the display.
When *rEC oFF* option was used, *SUM* indicator disappears after pressing →*T*← key.

## *15.11 Function for weighing animals (LOC)*

The function allows weighing animal moving on the scale.




Press *MENU* key.
When L*OC* is displayed press *→T←* *key*.
The following options appear on display successively:
- *LOC oFF* – out of function,
- *LOC on* –automatic measurement after loading the scale,
- *LOC Prn* – measurement initiated by pressing ⮆ key,
- *LOC CFG* – function configuration

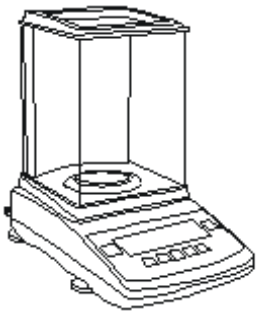
When *LOC on* is displayed press *→T←* key.
Tare the scale using *→T←* key if necessary and place the animal on the pan.
Wait until the weighing result is averaged – scale display will be blinking. Then scale will show stable averaged result and will send it through serial port. Final result is displayed on the display and send via serial port to computer or printer.
The result remains on display for about 10 second.
If we choose LOC CFG option can choose from:
- *LOC SPL* – inserting number of samples,
- *LOC tM* – inserting sample time,
- *LOC thr* – inserting work threshold (weight that will be surely exceeded after putting an animal on the scale).

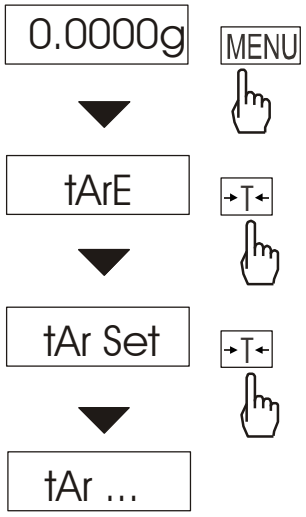
***Important notes:***
*1. The loads less than Min are not averaged.*
*2. In the case when placing the animal takes more than 5s, it is advised to use LOC-2 option (measurement initiated manually). It will allow performing measurement in right moment pressing ⮆ key*

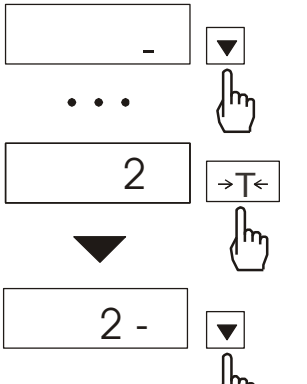
## *15.12 Tare memorizing function (tArE)*

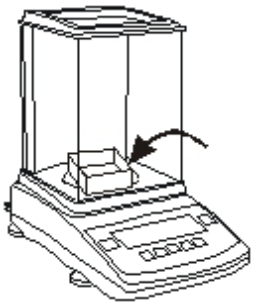
This function enables to measure gross weight of a sample placed in a container of a known weigh value (stored in the memory) and to display calculated net weight of the sample. Tare value is recalled from the memory with *→T←* *(or →0← when pan is unloaded)*. Tare value may be entered using the keypad or by sampling container weight from the pan.

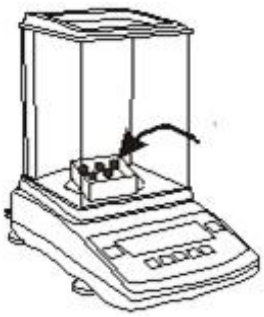
**Inserting tare value using keypad*:***





After pressing *MENU* key and choosing *tArE* function using *→T←* *key* ,functions below are displayed:

- *tAr OFF* – function off,
- *tAr on* – function on with tare inscribed earlier,
- *tAr SET*:
  *tAr PAn* – actual mass on pan setting as tare,
  *tAr ...* – inscribing tare using: ▼, ⊏→, *→T←* i *MENU*.

Choose tare inscribing function using *→T←* key.

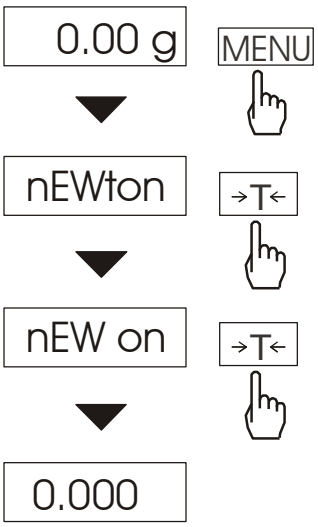
After inscribing scale works with new tare value. The scale will show nett mass (the actual object mass minus tare value).

Each using of *→T←* *key* (or *→0←*, when the pan is unloaded) will cause zeroing, and deleting memorized tare value (user will see minus indication) .

***ATTENTION:***

Tare value is also memorized after the scale is turned off.

## *15.13 Force measurement function (nEWton)*

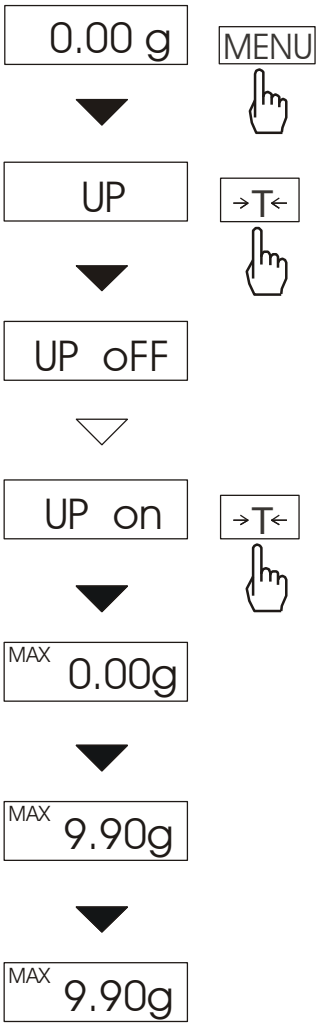



Function activation casues displaying measurement results in force units (mN).
Press *MENU* key .
*Using* →*T*← key choose *nEWton* and then *nEW on.*

*Attention:* 1mN≈0,1019g

## *15.14 Function for maximum value indication (UP)*

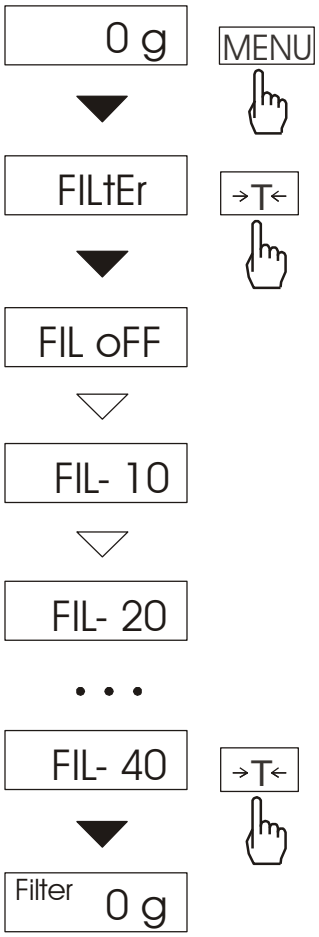
This function allows holding on display maximum value shown by the scale in a while




Before measurement the scale should be tared.
After using *MENU key*, choosing *UP* function , and then *UP_on*, the highest mass result will be hold on display.
Pressing *→T←* key will cause result zeroing.
If we choose *Up dW* option function will display the minimum mass result.

***ATTENTION:***
*Autozeroing function and the stabilisation indicator are deactivated when UP function is running. Weighing result is continuously averaged from 5 measurements.*

## *15.15 Anti-disturbance filter function (FILtEr)*




This function allows using digital filter with selected intensivity during weighing. Filter reduces the influence of mechanical vibrations (air blasts, base vibrations) on measurement result.

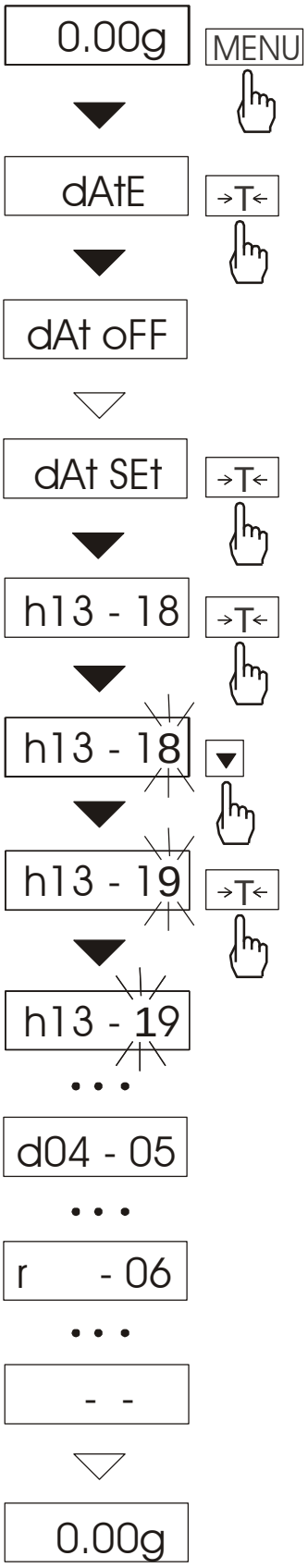
Press *MENU* key and select *FILtEr* pressing *→T←* key.
The following options will be shown successively on display:
- *FIL OFF* – filter off
- *FIL-10* - filter I (weak)
- *FIL-20* - filter II (medium)
- *FIL-30*- filter III (sharp)
- *FIL-40* - filter IV (very sharp)

Select on of four filters. This will cause starting weighing with selected filter.

In order to go back to normal weighing use *MENU* key once more and choose *FILtEr* and *FIL oFF*.

.

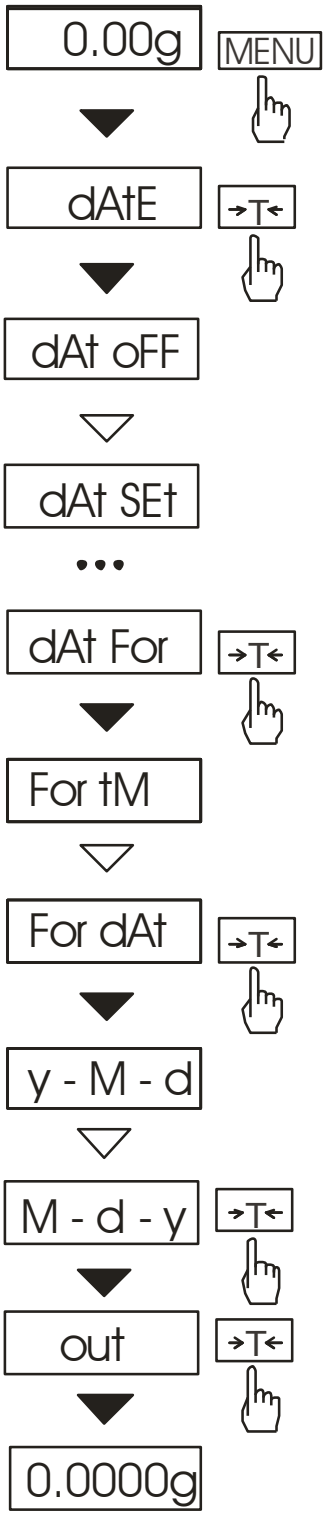
## *15.16 Date and time setting (dAtE)*




This function enables to set current date and time of internal balance clock and enable/disable date and time on weighing result printouts.

Options:
- *dAt oFF* – deactivate date printout,
- *dAt on* – activate date printout (using ⊏→ key),
- *dAt SEt* – change date and time.
- *dAt PIn* – inserting safety code to avoid changing the date by unwanted personnel. Insert the code using ▼, ⊏→, *→T←* and *MENU* (look chapter 6 ) keys. After code confirmation, before each entering into dAtE function, the user will be asked to inscribe the code. To cancel the pin, enter dAt Pin option and write code: *0.*
- *dAt For* – selection of date and time format,
- *out.*

The example on the left presents how to set current date and time.



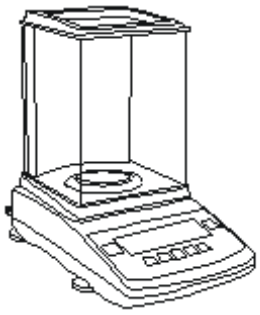

If we choose *dAt FOr* following options will appear:
- *FOr TM* – change of time format ( tM12h, tM24h),
- For dAt – change of displayed data year-month-day (y-M-d), month-day-year (M-d-y) and day-month-year (d-M-y),
-out .

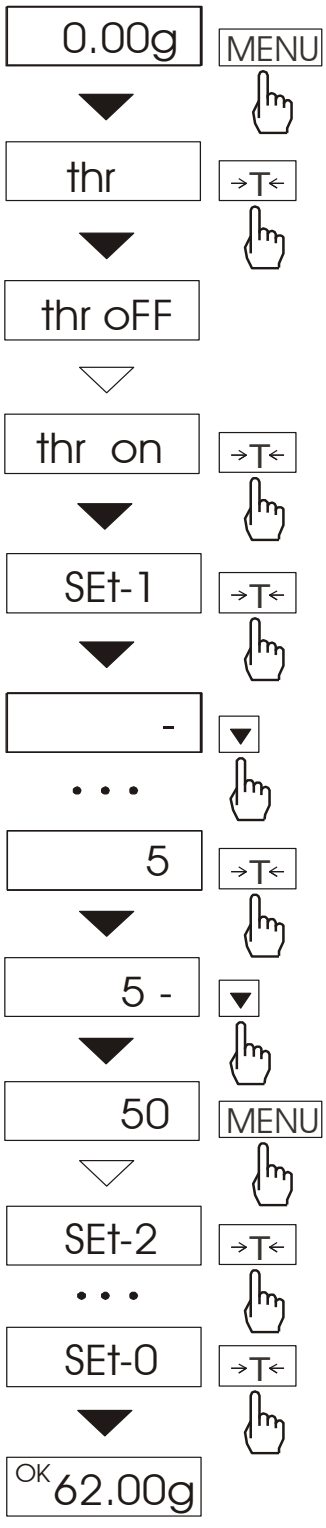
The example on the left presents how to change data format.

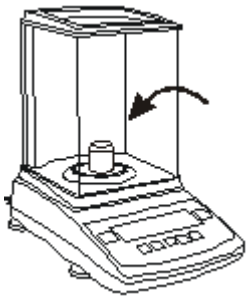
## *15.17 Treshold comparison function (thr)*

This function allows comparing weighing result with two programmed reference values: lower and upper threshold. Comparison result is signalled with indicators (MIN, OK, MAX) and sound signal generated when threshold values are exceeded.

***Operation sequence:***





Press *MENU* key and choose *thr* pressing →*T*← key.
The following options are displayed successively:
- *trESh oFF* – deactivate the function,
- *trESh on* – activate the function,
- *trESh Prn* – check last threshold values (press ⊏ key several times),
- *thr CFG* – function configuration (working mode, buzzer, flashing setting).

Choose *thr on* option using →*T*← key.
The following options for entering thresholds are displayed:
- *SEt-0* - go to weighing with signalling threshold excess,
- *SEt-1* - set lower threshold value,
- *SEt-2* - set upper threshold value,
- *SEt-3* - set zero signalisation threshold.

Using →*T*← key select *SEt-1* option.
Set lower threshold value using the following keys:
▼ - digit increase,
⊏ - decimal point,
→T← - move to next digit,
*MENU* - finish.
Then select *SEt-2* option and enter upper threshold value.

Choosing *Set-3* option will cause starting work with signalisation of exceeding thresholds and zero.
To leave the function, press *MENU* key and then choose *thr* and *thr-0* options.

If the comparison result is :
- smaller than lower threshold – the scale signals MIN (yellow colour),
- between threshold values - the scale signals OK (green colour, with the short sound signal),
- greater than upper threshold - the scale signals MAX (red colour, long sound signal).

The checkweighing results can be use to control:
- optical indicator (*Indication* mode),
- batching devices (*Batching* mode).

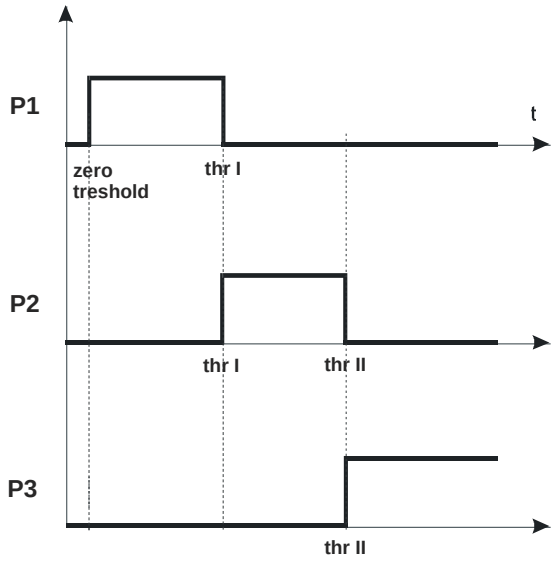
If we choose ***thr CFG*** option following options will appear:
- thr Out (working mode setting),
- thr buZ (buzzer work settings: EHC – buzzer turns on after exceeding threshold; STB – signal on after result stabilization in OK section),
- thr FLA (flashing on when lower or upper threshold is exceeded)
- out

User can choose from 3 working modes for thr out.
After choosing *thr Out* option following options display:
- *Out off,*
- *Out IPL* (batching mode),
- *Out bSt* ( level mode),
- *Out SGn* (indication mode).

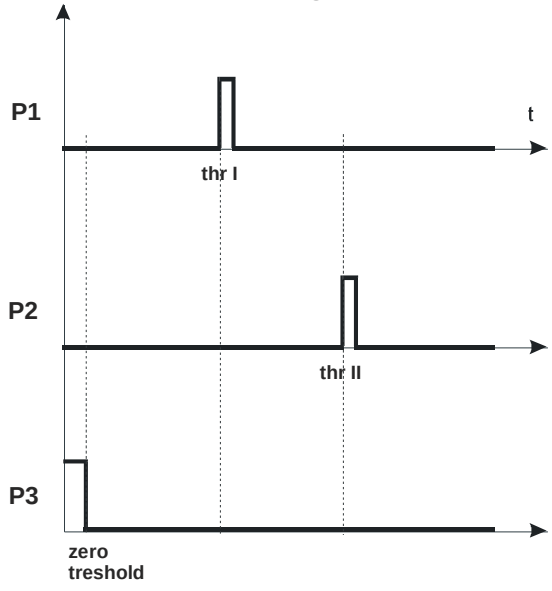
Standard scale is set for cooperation with optical indicator.

On the chart below output states are shown during increasing load on the scale for both working modes:

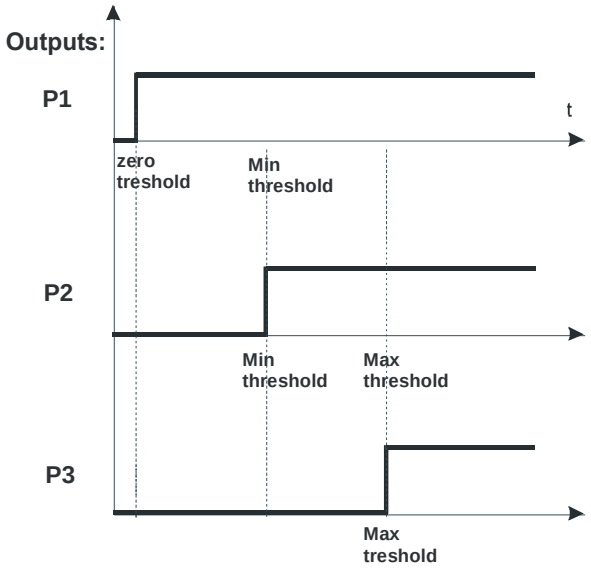
Indication mode:



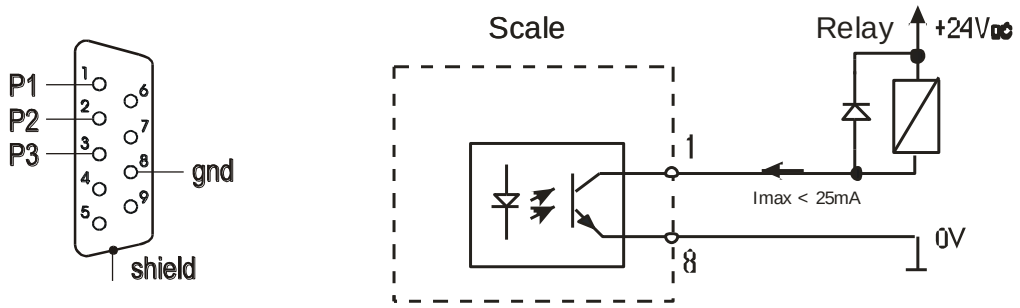

Batching mode:



Level mode:




In *Batching* mode on P1 (thr I) and P2 (thr II) outputs short-circuit impulses appears for time of 0,5s. On P3 (zero) output short-circuit state appears when indication does not exceed threshold value signalling zero load.
*Relays* connection diagram:

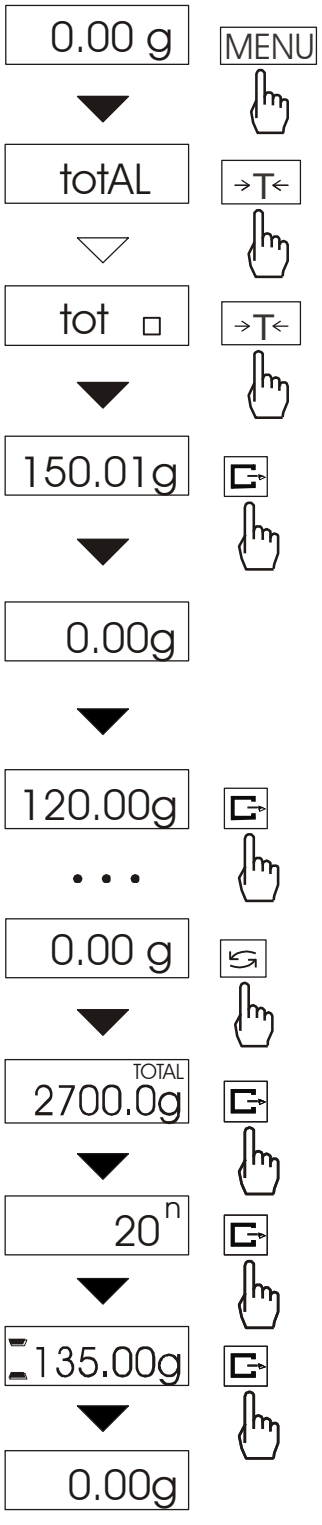



*Relays* output is the open collector transoptor output with load capacity 25mA / 24V. Transmitter inputs must be protected with diodes, e.g. 1N4148.
It is advised to use MS3K/P electronic board (sold separately), consisting of RM96P transmitters, with DC24V input voltage and AC250V, 3A output.

***Important notes:***
1. After switching the scale on, both thresholds are set to maximum values.
2. When setting upper threshold value, pay attention that its value is not below lower threshold value.
3. Setting lower and upper threshold value is possible after sending appropriate orders from computer, what is described in scale user manual.

## *15.18 Total weight function (totAL)*

The function allows calculating total weight for series of measurements, which can be greater than scale capacity. It allows calculating total weight as well as average value.




Press *MENU* key.
When *totAL* is displayed press →*T*← key.

The following options appear successively:
- *tot Prn* - report printout without clearing total register,
- *tot oFF* - clearing total register, report printout and leaving the function,
- *tot* □ - working with receipt printout after each measurement,
- *tot* - working without receipt printout.
- *tot CFG* – working mode change between Auto (weighing results automatically added to register) and Manual ( key used for saving to register).

Press →*T*← key when *tot* □ is displayed. Perform measurement series pressing key for storing results into total register.

In order to display results press key . Also it can be done by using *totAL* function and choosing option *tot Pr*n.

The results are display in the following sequence:
- total weight (≡*)*
- number of registered measurements (n),
- average value (=),

If You press key once again a sign *Tot End* will show up and signs *nO* and *yES* will appear succesively. If You choose *nO* , You can continue your measurement.

To leave the function with clearing total register, select *total* function from menu and choose *tot oFF* option. When It will cause the scale prints the communicate informing about clearing registers.

The form of receipt after each measurement:

```
Date:        ...      Time.   ...
measurement no      weight
measurement no      weight
```

Report form:

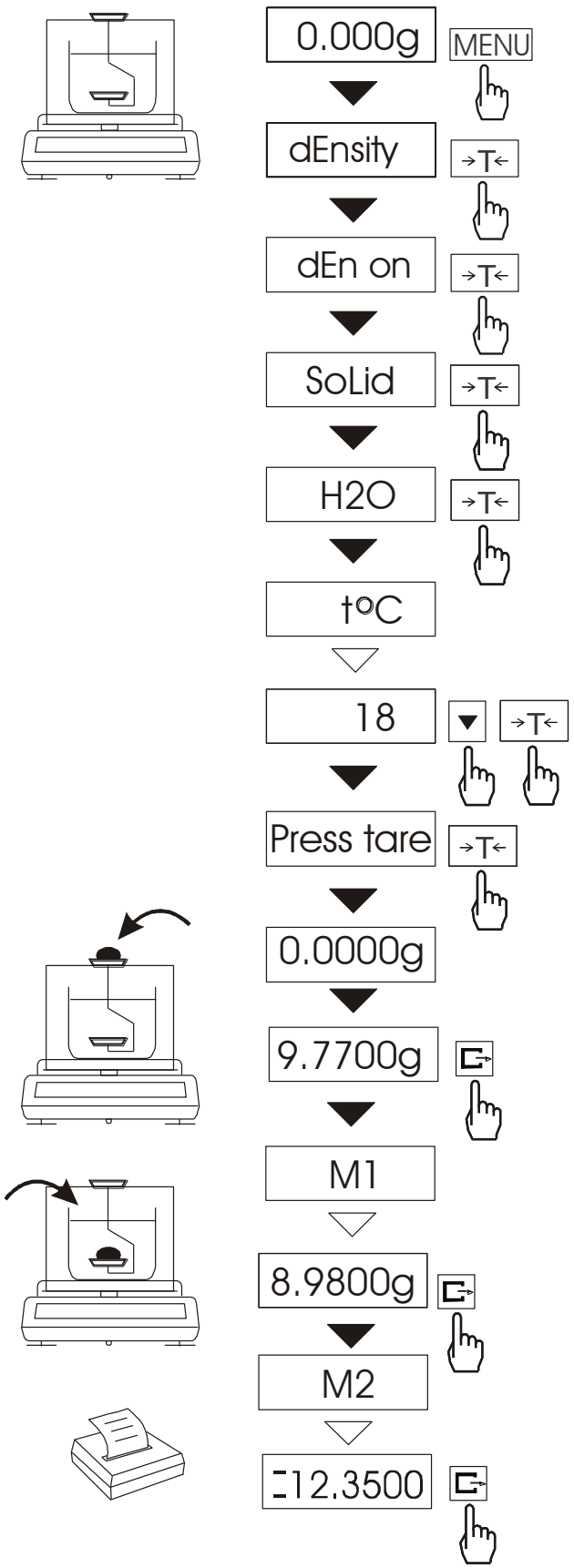
```
Date:          ...     Time.   ...
TOTAL WEIGHT              =
NUMBER OF SAMPLES  =
AVERAGE VALUE          =
```

***Note:***
*When the scale has not an internal clock, Date and Time do not appear on printout.*
*Maximum number of measurements 99 999.*
*Maximum total load 99 999 000d.*
*The weighing unit of the total value from the register (Total) is the same as the weighing unit stated on the keypad or is 1000 times greater, what is signalled by "o" indicator at the left of the display.*
*If the registered value is too big to be displayed, "E" communicate appears on the display.*
*If the number of series is too high and cannot be displayed, "Err1"communicate appears on the display.*

## 15.19 Density determination (dEnSity)

The description below describes density determination using HYDRO kit. In case below-balance weighing, operation sequence does not change.

### 15.19.1 Solids density determination




This function calculates material density basing on its weight in air and in water using the formula below:

$$\rho = \frac{m_1}{m_1 - m_2} * \rho_L$$

where, $m_1$ – weigh in air
$m_2$ – weight in water
$\rho_L$ - density of liquid

If distilled water is used, enter its exact temperature (accurate to 0,5°C) – the balance will calculate its density automatically.

To enter the value use the following keys:
▼ - digit increase,
⊏ - decimal point,
→T← - next digit,
*MENU* - end.
When using liquid other than distilled water or ethanol, choose OTHER (instead of H2O and Ethanol) option and enter its density according to its temperature.

Phase I: measurement in air.

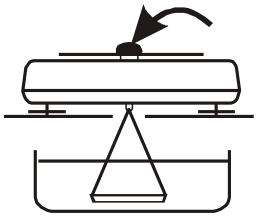
Phase II: measurement in liquid.

To print measurement result and begin next measurement press ⊏ key.

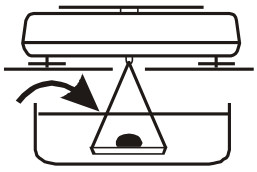
To print a density determination report after all necessary measurements, connect a printer to the balance and press key. A sample for solid mass density determination is shown below:

| | |
|---|---|
| Date: ... | Time ... |
| MEASUREMENT NO. | = ... |
| WEIGHT in air | = ... g |
| WEIGHT in a liquid | = ... g |
| DENSITY | = ... g/cm$^3$ |
| | |
| Liquid density | = ... g/cm$^3$ |
| Liquid temperature | = ... $^o$C |

Operation sequence (weighing in air and in liquid) for below-balance weighing:

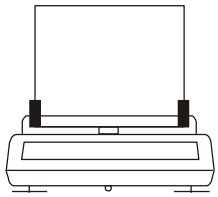


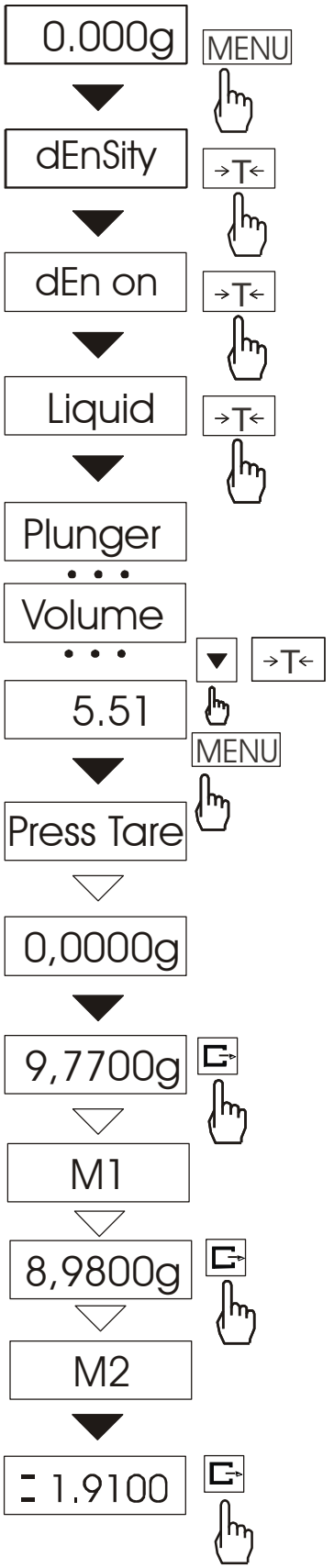
Phase I: measurement in air.

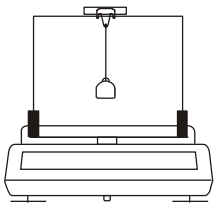


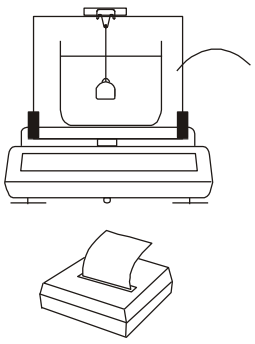
Phase II: measurement in liquid.

### *15.19.2 Liquid density determination*







This function determines liquid density basing on plunger weight in air and in examined liquid with known volume, using the formula below:

$$\rho = \frac{m_1 - m_2}{V}$$

where
$m_1$ – plunger weight in air
$m_2$ – plunger weigh in a liquid
V – plunger volume

Plunger volume is stored on its hanger.

To enter the value use the following keys:
▼ - digit increase,
⊏→ - decimal point,
→T← - next digit,
*MENU* - end.

Phase I: measurement in air.

Phase II: measurement in liquid.

To print measurement result and begin next measurement press ⊏→ key.

To print a density determination report after all necessary measurements, connect a printer to the balance and press ⎙ key. A sample for liquid density determination is shown below:

| | |
|---|---|
| Date: ... | Time ... |
| MEASUREMENT NO. | = ... |
| WEIGHT in air | = ... g |
| WEIGHT in a liquid | = ... g |
| LIQUID DENSITY | = ... g/cm$^3$ |
| PLUNGER VOLUME | = ... g/cm$^3$ |

## *15.20 Statistical calculations function (StAt)*

***Attention:*** Function is available on demand and it replaces other special functions.
This function evaluates from series of measurements (max 500) statistical parameters of weighting process. Adding successively measurements to register is automatic and it occur after the scale is loaded and its indications stabilize.
After each loading printout is made with: number of measurements, result, date and time.
Next measurement is made after taking off earlier load.

For the obtained measurements series the scale evaluates:

- n - number of samples
- sum x - sum of all samples $sum\_x = \sum x_n$
- $\bar{x}$ -average value (sum x)/n
- min -minimal value from n samples
- max -maximal value from n samples
- max-min -maximal value minus minima value
- S -standard deviation $S = \sqrt{\frac{1}{(n-1)} \sum_n (x_n - \bar{x})^2}$
- srel -variance factor $srel = \frac{S}{\bar{x}}$

Statistical calculations results can be printed.


1. Press *MENU* key.
2. When *StAt* is displayed press *→T←* key.

Following options will show successively on display:

- *StA Prn* – monitoring and printout of statistical data,
- *StA oFF* – function off,
- *StA o* – function on, working with single weight results printout,
- *StA -* – function on, working without single weight results printout,
- *StA CFG* – function configuration:
  - *Auto* – automatic work (sample is confirmed after putting load and indication stabilization),
  - *ManuAL* – manual work (confirmed by pressing ⮆ key).
- *out* – out of function.

3. Press *→T←* key when *StA o* is displayed .
4. Put successively samples of product on the pan, (take off after indication stabilization) in order to inscribe them into measurement register.
5. In order to obtain statistical results for measurement series press *MENU* key and *→T←* key when the *StAt*. sign is displayed and then *StA Prn*.

Successive results are displayed after pressing ↻ key:

n – sample number.
= - average mass,
≡ - standard devation,
≡% - relative standard devation,
MIN – minimal mass,
MAX – maximal mass,

After pressing *→T←* key during *StA End* displayed, user can end displaying statistics.

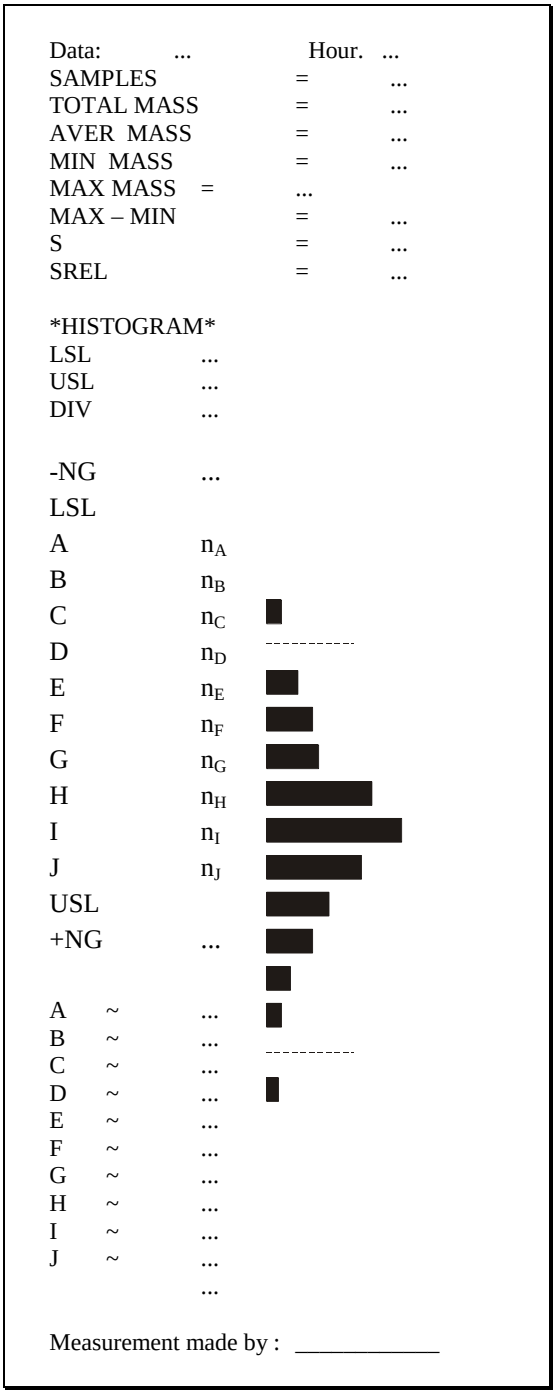
This will cause printout of calculated statistics and histogram :

LSL - allowable lower value,
USL - allowable upper value,
A, B, C, .. – measurement intervals,
$n_A$ ... – amount of measurements in A interval;
measurement is in A interval if it is bigger or equal to A interval threshold and smaller
than B interval threshold.
$n_B$ ... - amount of measurements in B interval;
measurement is in B interval if it is bigger or equal to B interval threshold and smaller
than C interval threshold.

Thresholds are printed under histogram.

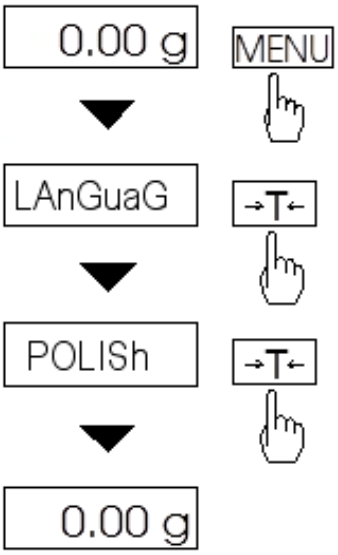
-NG - amount of measurements under allowable lower value
+NG - amount of measurements above allowable upper value

To finish work with this function and zeroing result register press *F* key, then during "*StAt*" and "*F.*" is displayed, press →*T*← key. This will cause printing message about register zeroing.



## *15.21 Printout language selection (LAnGUAG)*

*LAnGUAG* function enables to select printouts language (calibration reports, *total* printouts and *hYdro*).




Press MENU key.
When *LAnGUAG* function appears press →*T*← key.
On the screen will succesively appear:
- *POLISh* ,
- *ENGLISh*,
- *GErMAn*,
- *rUSSIAn*,
- *UkrAIn* ,
- *CZECH*,
- *SPAnISH*,
- *out.*

Choose the proper language and press →*T*← while it's displaying.

Example of printouts in polish and English language:

- calibration report

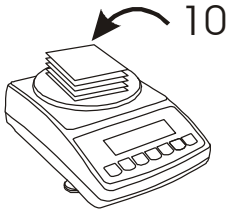
| | |
|---|---|
| **RAPORT Z KALIBRACJI** | **CALIBRATION REPORT** |
| **NUMER FABRYCZNY** | **FACTORY NUMBER** |
| **NUMER PROGRAMU** | **PROGRAM NUMBER** |
| **MASA KALIBRACYJNA PIERWOTNA** | **CALIBRATION PRIMARY MASS** |
| **MASA KALIBRACYJNA** | **CALIBRATION MASS** |
| **RÓŻNICA MAS** | **DIFFERENCE MASS** |

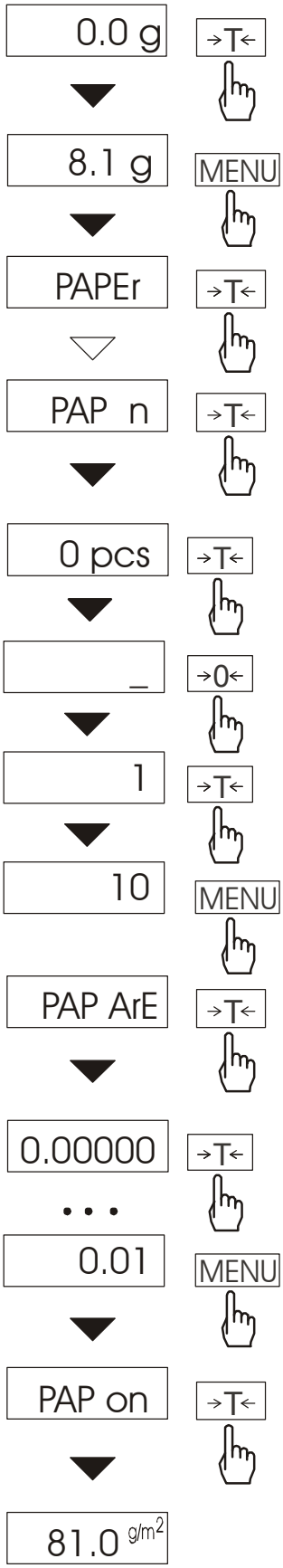
- **total** function report

| | |
|---|---|
| **UWAGA ! WYZEROWANIE REJESTRÓW** | **WARNING! ZEROING REGISTER** |
| **stan przed wyzerowaniem** | **results before zeroing** |
| **TOTAL** | **TOTAL** |
| **WARTOŚĆ ŚREDNIA** | **AVERAGE VALUE** |
| **LICZBA NAWAŻEK** | **NUMBER OF MEAS** |
| **PRZEKROCZENIE ZAKRESU** | **RANGE EXCESS** |

## *15.22 Paperweight calculation (PAPEr)*

This function enables to calculate paperweight of $1m^2$ of paper basing on samples of known area. For quick access, the function is accessible directly by pressing ↻ key.



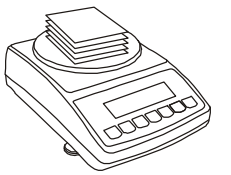




The balance must be tared just before the measurement.
Place the specific sample quantity of the same area (possible values: 1, 2, 5, 10, 20, 50, 100).
Press *MENU* key to access Function Menu. To enter the function press *→T←* key when "PAPEr" is displayed.
*PCS* is the number of samples placed on the pan. To choose previously used value, select *old* option.

"ArEA" is the area of a single sample. It is possible to choose standard values (0,02 or $0,1g/m^2$) or enter specific value ("A" option).
To enter the value use the following keys:
▼ - digit increase,
⊏ - decimal point,
→T← - next digit,
*MENU* - end.

The balance is ready for the next measurements.

↻ key causes passage to mass measurement and enables next samples (with other quantity and surface of a single sample) measurement start.



## *16. Troubleshooting and maintenance*

1. The balance should be kept clean.
2. Take care that no dirt is between the casing and the pan. If a dirt is noticed, take off the pan (lift it up), clean a dirt and then mount the pan.
3. In case of improper operation caused by a short-lasting lack of power supply, switch the balance off by unplugging it from the mains, and then after several seconds switch it on.
4. All repairs of the balance should be performed by authorised service centre.
5. To repair a balance, please contact nearest service centre. The list of authorised service centres is given in guarantee card.
6. Balances can be sent for repair as messenger delivery only in original package, if not, there is a risk of damaging the balance and loosing guarantee.

***Failure messages:***

| Message | Possible cause | Recommendation |
|---|---|---|
| *C-1 … 6*<br>(more than 1 min.) | negative result in one of autotests | if message still remains, contact service centre |
| *L* | no pan on the balance | put the pan on |
| | mechanical damage | contact service centre |
| *H* | overweight of the balance | take a load off the pan |
| | mechanical damage | contact service centre |
| *Err-H* | load left on the pan | take a load off the pan |
| ◣◢<br>indicator<br>does not work | unstable balance position,<br>ground vibration,<br>air flows | locate the balance in place where stable results are maintained |
| | damage of the balance | contact service centre |
| - - - - - - | taring not finished | contact service centre |
| *Pr-on* | Calibration switch is in ON position or switch is damaged | Change switch position into OFF or contact authorised service |

# Declaration of Conformity

We:

***AXIS*** Spółka z o.o. 80-125 Gdańsk, ul.Kartuska 375B

Confirm with all responsibility that balances:

*AGN50C, AGN100C, AGN200C and AGN220C*

marked with CE mark comply with the following:

1. EN 55022:2000 Electromagnetic compatibility (EMC) – information technology equipment – Radio disturbance characteristics - standard Limits and methods of measurement and IEC 61000-4-3 - Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test harmonized with the directive 2004/108/WE (Electromagnetic compatibility).

CE 15 M

Moreover scales with the following markings on the name plate:

- the number of the Notified Body responsible for EC verification — 1443
- two-digit number of the year of EC verification
- a green metrology sticker with “M” mark
- a protective seal affixed by the Notified Body

comply with the requirements on the Type-Approval Certificate No. TCM 128/07-4511 and are verified to comply with:

2. EN 45501 norm Metrological aspects of non-automatic weighing instruments and with 2009/23/WE directive.

Additional information
- Conformity evaluation for the Council Directive 89/336/EEC (replaced by 2004/108/WE) was carried out by Laboratorium Badawcze Oddziału Instytutu Elektrotechniki in Gdańsk, accredited by PCA,
- Type-Approval Certificate No. TCM 128/07-4511 was issued by Česky Metrologicky Institut Brno (Notified Body no. 1383).

Per pro Director of AXIS Sp. z o.o.:

Production Manager Jan Kończak _____ Date: 14-11-2014